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Release Notes

Move over TiVo!

TiVo's cool. It's cheap, easy to use, and it has forever changed the way we watch TV. Try as it might to imitate a PC, however, TiVo falls far short of what a true PC can deliver. And as much as we appreciate its simplicity—and reliability—the device pales in comparison to a slick home-theater PC (HTPC).

Whatever you choose to call it (living-room, home-theater, entertainment, or Media Center PC), this platform is an exciting and rapidly evolving frontier for digital entertainment. The HTPC is capable of doing so much more than even the most advanced TiVo machine, with time-shifting and media streaming being just the tip of the proverbial iceberg.

A HTPC is infinitely more upgradable and flexible than any TiVo machine. You can use it to play games and it will stream music, digital photos, TV, and video throughout your home. It's the perfect tool for editing pictures and video, too. And, of course, it can do all that "other stuff": surf the web, send and receive e-mail, and instant message—all from the comfort of your Cheetos-covered couch.

Series2 TiVo boxes wouldn't be able to do all their fancy new dance steps—burn DVDs and stream music, radio, and pictures—without their PC partners fulfilling the vital role of media server. The PC, on the other hand, is comfortable dancing by itself—right into your living room.

You should brace yourself for the dramatic impact a HTPC will have on your home-entertainment center: You just might discover that you no longer need your DVD or CD players, or that crusty old VCR. And if you've been searching for justification to replace that aging CRT TV with a fancy-pants big-screen plasma display, the entertainment PC is the excuse you've been looking for.

That said, figuring out exactly how to best integrate a HTPC into your living room can be a confusing proposition. What type of display should you buy, which connections will deliver the best audio and visual results, and how should you wire your digital home—or can you do it all without wires? And what about HDTV—can your HTPC handle that, too? (Yes!) Don't sweat it: We're going to answer all of these questions, and many more.

Let's get it started!

—Stephen P. Klett Jr.
sklett@maximumpc.com

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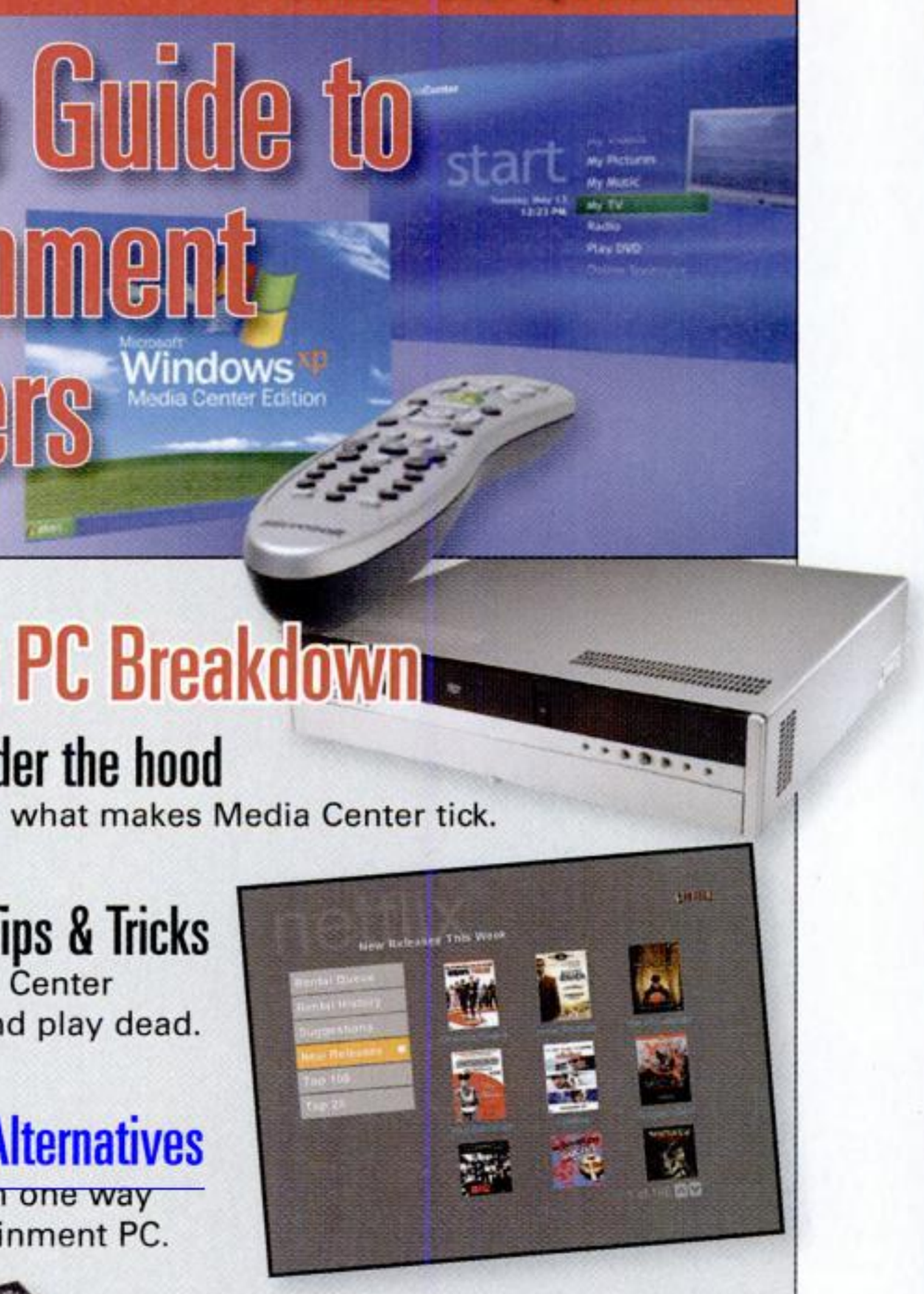

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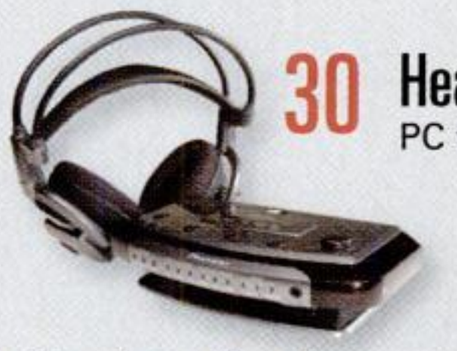

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Media Center

Join us as we pop Media Center's hood and poke, prod, and fine-tune it to run at peak efficiency

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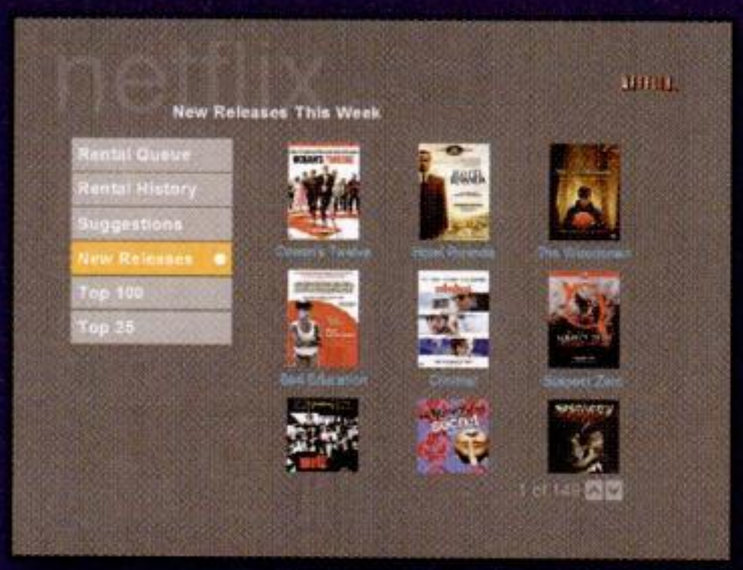

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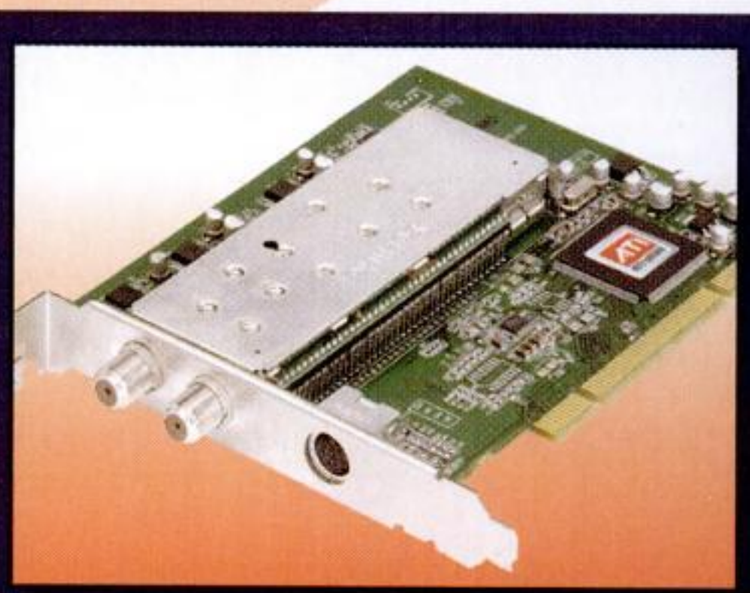

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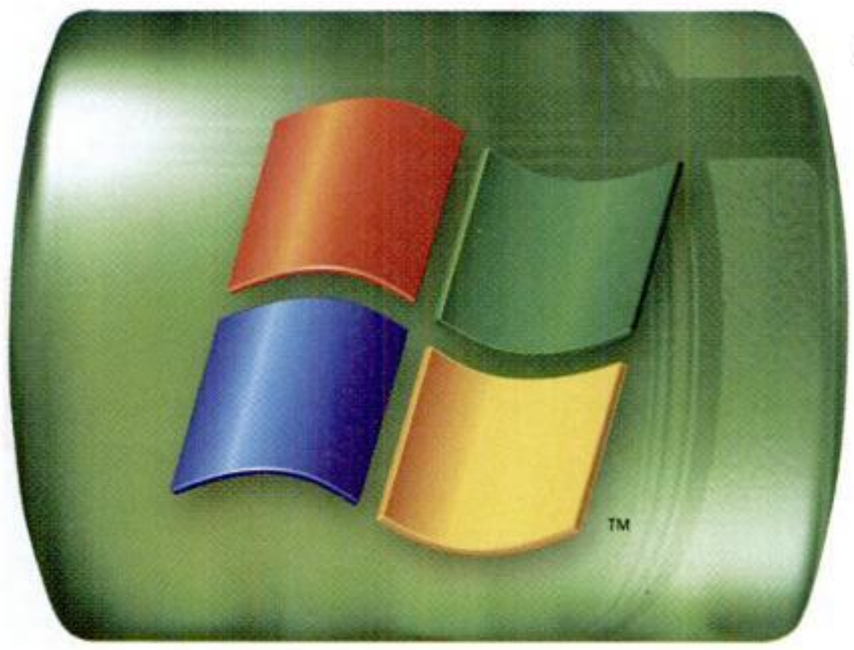
Exposed

It's not a stretch for a PC to make itself over into a digital video recorder, a DVD/CD player and recorder, a game console, a music server, an FM radio, and a repository for storing and displaying photos and camcorder content. More so than any other device, PCs are built to handle digital media. They were doing it long before *Media Center's* couch-friendly interface came onto the scene; they just didn't do it as easily.

As digital has supplanted analog in just about every facet of entertainment, PCs have taken on a more central role. When DVDs banished tapes to the dustbins, PCs were there to digitize the video and burn it to disc. When CDs and MP3s made records obsolete, PCs became another platform for buying and sharing music. Now, with digital cameras well on their way to replacing film, PCs are ideally placed to take the place of one-hour photo booths.



Some might call it the PC's natural evolution. By some, we mean Microsoft. The 200-pound Redmond gorilla has, at times, enabled and, at other times, held back the PC's evolution by picking and choosing what technologies to support in Windows. Recently Microsoft put its weight squarely behind the home theater PC with Windows XP Media Center Edition 2005. In the process, it took a big step toward achieving the elusive entertainment-hub Holy Grail status Bill would like XP to own.

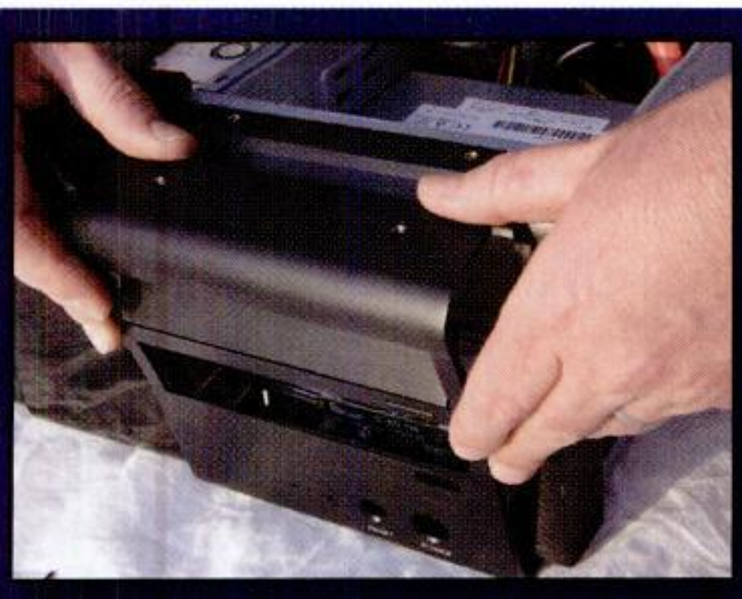
Media Center 2005 is essentially an enhanced version of Windows XP, which is designed to make PCs the media and entertainment centers of the home. It serves up music, pictures, video, and live television to TVs, stereos, and portable and wireless devices. Instead of the standard Windows desktop, Media Center uses a slick, scrollable blue interface that you launch with a single button-press, and that you can navigate from across the room with a remote control. This front-end presents all the media tools that record, catalog, and store the media on your PC.

Along with a number of enhancements that range from built-in photo manipulation tools to CD- and DVD-burning software, the best thing the 2005 edition of Media Center has going for it is better hardware support. Microsoft added support for up to three TV tuners, which means you can watch one show while recording two others. And tuner support finally includes HDTV tuners that receive over-the-air high-def broadcasts.

The OS still has a ways to go. For starters, it's not as stable as it needs to be to even get near the comfort zone that TiVo owners have when they leave their home for the weekend, secure with the knowledge that their trusty TiVo will record the season finale of *The Apprentice*. And, while you can make Media Center act like a TiVo—record multiple channels simultaneously while you watch a recorded program, for example—it's not nearly as plug-and-play, or elegant. However, no matter how powerful and feature-laden your TiVo may be, any Media Center PC will eclipse it in raw power and flexibility.

To raise its trust factor, Media Center still needs to be refined, and some bugs worked out—see story, page 25. However, Media Center 2005 does represent a quantum leap forward for the OS. PC makers also still need to figure out the best form factor and features for what a Media Center PC should be—but they're getting closer, too, as our roundup (page 36) will attest.

If you've been itching to integrate a PC into your home entertainment setup, it's time to start testing the waters. Media Center isn't just for early adopters any more. In the following pages we'll discuss every aspect involved with integrating a Media Center–based entertainment PC into your living room. ▶



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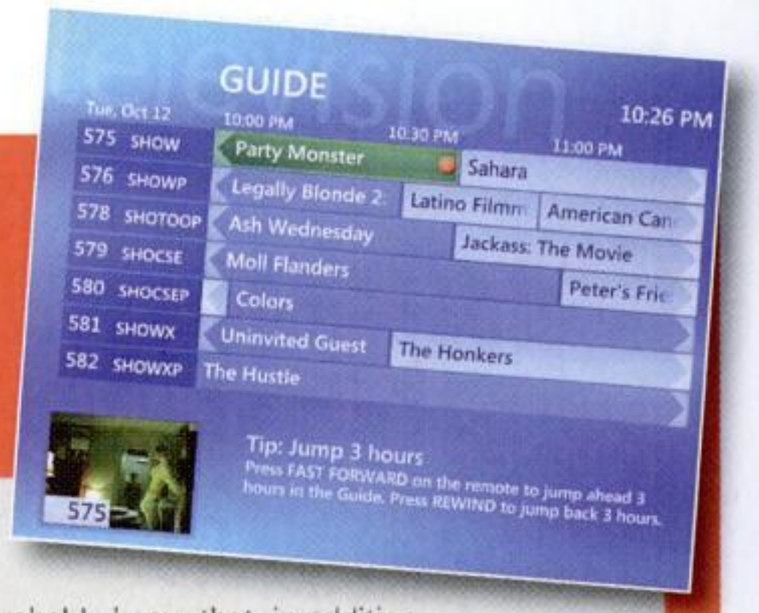
Media Center Guided Tour



Chances are you haven't seen much of Windows XP Media Center Edition 2005. So before we get into the tricks, let's take a quick spin through the OS' most prominent features.

THE GREEN BUTTON

It all starts here. Per Microsoft's spec, the centerpiece of the remote also serves as the informal icon for Media Center. The green button functions similarly to the TiVo button on TiVo remotes; whenever you press it, you're taken to the Media Center start page and the interface you see below.

While Media Center remotes come in a wide variety of shapes and sizes, there is a standard spec dictating where the buttons are positioned in relation to one another. We've heard rumors, however, that this spec is about to change. That's a good thing—while we like the green button, we found it difficult to find a "home" location for our fingers when using the Media Center remotes. In addition to being easier to use, TiVo's directional-pad style of navigation makes it easier to transition from menu navigation to the fast-forward, reverse, and play buttons.

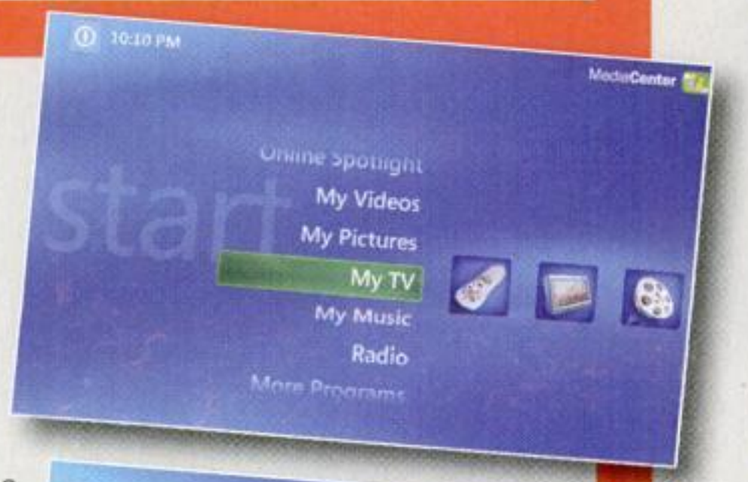
THE DIRECTED INTERFACE

Media Center is essentially a Windows applet. It runs on top of Windows XP (when you boot, it replaces the Windows desktop). The 2004 version forced you to manually launch the Media Center interface from the WinXP desktop. The 2005 version, which emphasizes the "10-foot" experience—Microsoft parlance for allowing you to control everything with your remote control—launches directly into Media Center.

Media Center looks and feels like a completely separate OS. For example, it features a unique "directed interface" that allows you to use your remote to scroll through and select a usage mode—pictures, TV, music, etc. From there, the 2005 version lets you drill down into further options without reverting to the main menu.

"Right-click" functionality, which allows you even more contextual options, like burning audio CDs within the Music section, can also be accessed in the new version by pressing the "More Info" button on the remote.

Finally, here's a tip: If you have an old version of the Media Center OS and want to boot straight into Media Center, simply drag a shortcut of the green Media Center icon into your Startup folder.



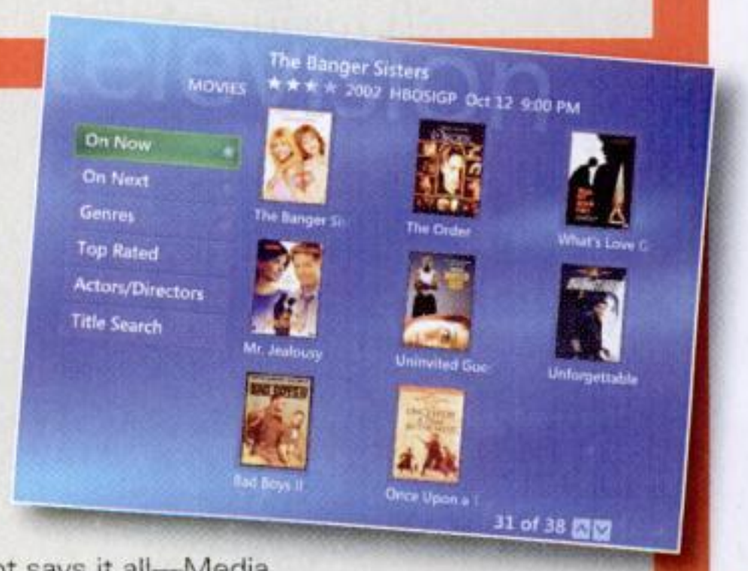
RECORD YOUR FAVORITE TV SHOWS

Even if you don't have a TiVo, you probably know that, in addition to allowing you to pause live television, the device also allows you to quickly and easily record TV shows.

Media Center enhances TiVo's notions of PVR (personal video recording) functionality by minimizing the TV viewing area to the bottom left-hand corner of the screen while you're browsing the built-in program guide, plus it has a full color interface. Also nice: The new 2005 version of Media Center allows you to instant message (MSN Messenger only) and chat with your friends while watching TV.

Finally, the 2005 version of Media Center includes two built-in tuners, and features support for a third HD tuner, which allows you to hook two standard cable/satellite boxes and one HD box up to the same PC. Conveniently, the Media Center OS will automatically switch between them when necessary, which means that you can watch TV while recording two different shows.

MOVIE WATCHING: MUCH BETTER THAN TIVO



Although recording and watching movies is a sub-function of recording and watching TV, the manner in which the 2005 version of WinXP Media Center Edition allows you to sort, browse, and select movies to watch and/or record is truly amazing. This screenshot says it all—Media Center automatically aggregates all the movies currently playing on all the channels you receive, and includes the thumbnail movie posters for those movies. You can also see what movies are on next, and sort these and all other movies appearing in the next two weeks by star rating, cast, genre, and a few other categories. This is indispensable for movie buffs—you can sort through all the movies for the next two weeks and set them to record. Assuming you have the hard drive space (two-hour movies take up about 2GB each), you can build a massive library of recorded films!

MUSIC AND PHOTOS

In addition to recording TV and allowing you to watch DVDs, WinXP Media Center Edition also organizes all of your music and photographs into one, easy-to-use package. This is particularly nice if multiple people use your PC; rather than wade through each individual "My Documents" folder, you can aggregate them all in Media Center. Even though you can play slide shows, and choose music to accompany them, it would be nice if this process was automated or made easier. As it stands now, you have to first choose your music, then choose the slide show. In a nice touch, the slide show automatically pans across your photos during play.

New to the 2005 version of Media Center Edition: The OS automatically detects if you're on a network and asks if you'd like to add any shared folders to its library. This is nice if you store music files on different PCs in your house, even at the relatively low data transfer rates of Wi-Fi. Additionally, the OS includes a utility that will convert all your music files into WMA or WMA lossless format.

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Media Center Tips and Tricks

Now, we're going to make Media Center play dead and roll over...

Don't be fooled by the simple façade. The big blue screen, the program guide, the green button...all of this is just decoration for a versatile operating system. Dig deeper and Media Center Edition's true underpinnings are uncovered. Layer upon layer, the work that goes into manipulating your photos, music, movies, and television reveals itself as common PC tasks that can be tweaked, modified, and optimized.

When it comes down to it, Media Center's big text and simple menus are there to put a pretty face on standard media-manipulation. The smoke and mirrors behind DVD viewing is just MPEG-2 decoding and video overlays. MP3 and WMA playback comes down to unpacking highly compressed files and streaming the audio through the right connection. Time-shifting is video-capture and playback accelerated to a usable speed.

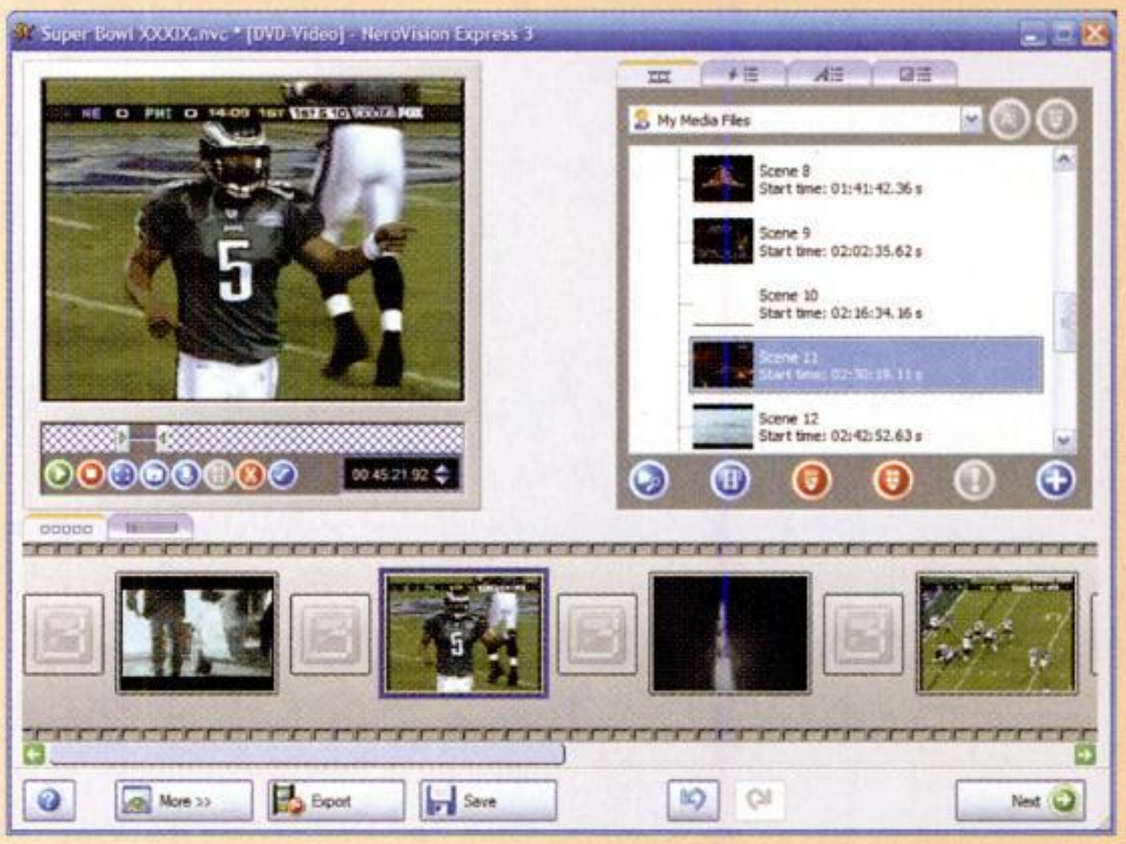
Presented here are some great ways to make your Media Center PC fetch, play dead, and roll over. Well, maybe not, but these tips and tricks *will* make your Media Center PC run much better.

1 Burn a Universal DVD

Media Center records TV in a new flavor of WMV that contains information regarding program contents, in a similar way that ID3 tags holds song information in an MP3. DVR-MS files can't be read by standalone DVD players and Media Center doesn't record in any other format, which makes it tough to burn the latest episode of *Lost* and watch it on a DVD-player in another room. When you burn a recorded show to disc using the Create DVD/CD wizard, it can only be read by WinXP systems running Windows Media Player 10 or Media Center. Media extenders and portable media-players can play DVR-MS files, but only with a Media Center PC's (HTPC) help.

Microsoft doesn't supply any software for editing or converting DVR-MS files into another format. For that you need software like *NeroVision Express*, which comes with *Nero Ultra Edition* and is available as a trial version on the Nero web site at **www.nero.com**. There are other apps that allow you to do the same thing, but *NeroVision Express* is our favorite because it lets you edit video, add a menu system, and burn a DVD from the same interface. Although not as advanced as other video editors, *NeroVision Express* makes it easy to cut out commercials and burn TV shows in a format that standard DVD players can read.

If you're looking for some free utilities that can help you edit your recorded TV, try *DVR 2 WMV*, which is a simple tool that strips the program data from DVR-MS files and leaves them in an editable WMV format. From there you can use XP's included *Windows Movie Maker* program to clean them up. *DVR Ripper* is another freeware conversion utility that isn't as pretty, but it's certainly more usable. *DVR Ripper* bypasses WMV and rips straight to MPEG-2, which is the lingua franca of DVD players. If you want to burn the converted files to DVD you're going to need a third-party app, such as *Nero*, since *Movie Maker* only burns WMV files.

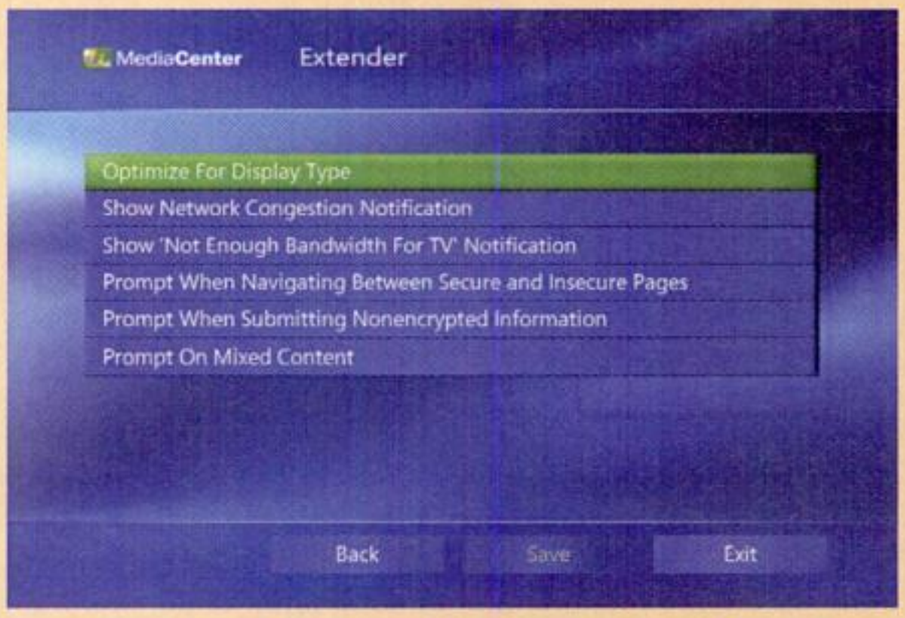


The automatic scene detector in *NeroVision Express* automatically breaks up large video files into multiple DVD scenes.

2 Install the Media Center Power Toys

Just as it did for Windows XP, Microsoft has created a suite of add-on applets for Media Center called PowerToys (check out the included CD for links and programs). This suite includes a music playlist editor and *Solitaire* card game; both are designed to work through a remote control. The *Alarm Clock* PowerToy schedules the Media Center to switch on the radio or TV, or play music, at a specific time.

The handiest PowerToy, however, is *Tweak MCE*, which lets you fine-tune a number of Media Center settings. You can use it to program universal remotes and specify the amount of time your remote skips ahead and back with a single press of each button. *Tweak MCE* also lets you turn off that annoying feature that automatically starts up the enhanced contents included on DVDs such as *The Lord of the Rings*. For Media Center extender users, this is also the only tool that lets you tweak your media output specifically for viewing on plasma and LCD TVs. Along with *Tweak UI* for Windows XP, this little utility is a must-have.



Microsoft's *Tweak MCE* PowerToy provides a lot more settings for pesky Media Center Extenders.

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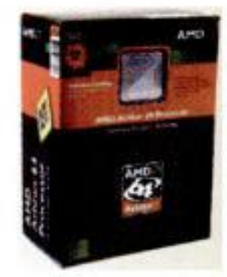

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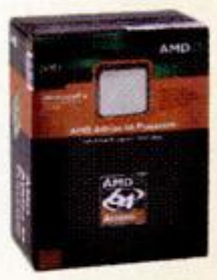

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3 Plethora of Plug-ins

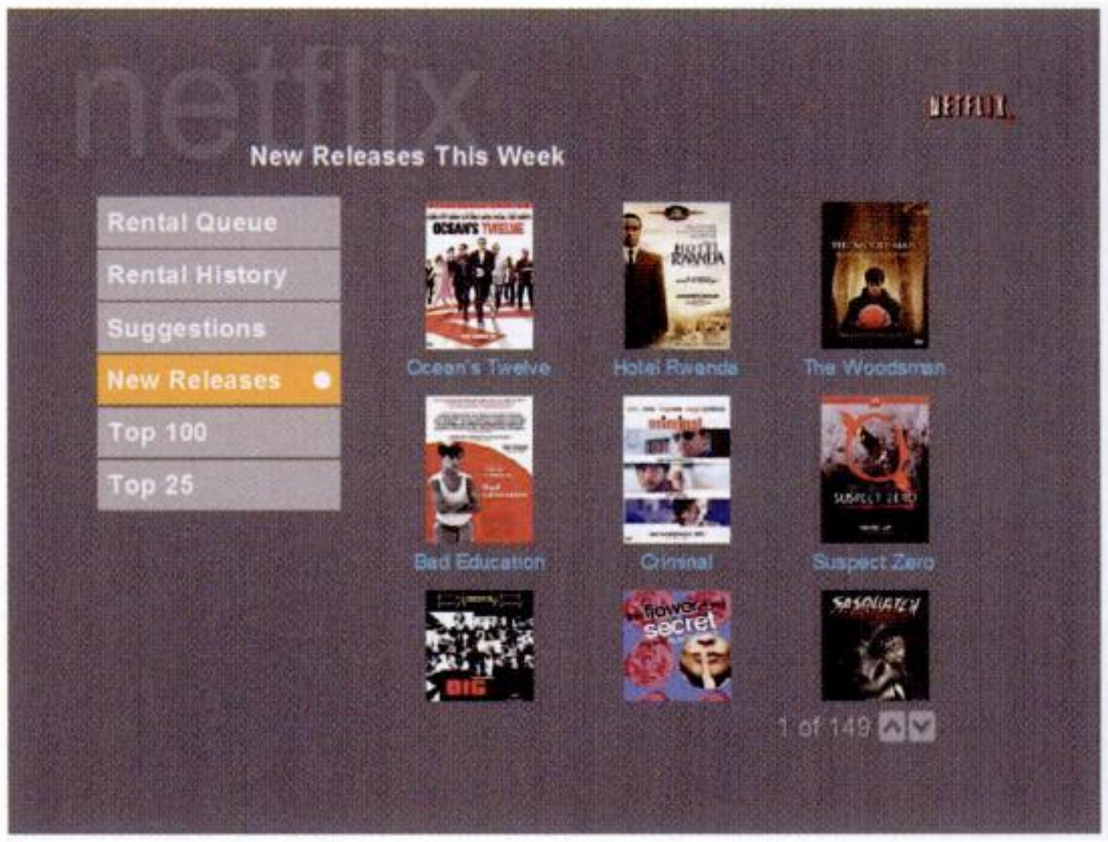
Media Center has a robust plug-in architecture for dropping in new features, which has become pretty popular with programmers in the U.S. and Europe. Most of the plug-ins are in various stages of development and are available as freeware. The best places to find these are at **www.mcesoft.nl** and **www.thegreenbutton.com**.

MSN Remote Record. This is a slick little app that lets you add shows, via the internet, to your Media Center's recording schedule. It's great when you're at work and you realize that a new *Iron Chef America* is on that afternoon that you simply have to see. The only drawback is that you have to create an MSN account to use it.

Share Recorded TV. If you have two Media Centers, this handy tool will give you access to whatever shows you've recorded on either system through the Recorded TV screen.

RSS Reader. Just as the name says, this plug-in displays RSS 2.0 streams across Media Center's ten-foot interface, which is the moniker for the blue interface you launch with that fancy green button on your Media Center remote. Once you've subscribed to a bunch of RSS streams you can rip through your favorite sites pretty fast, using just your remote.

My Weather. This one pulls current conditions and a 10-day forecast from the Weather Channel and formats them for your Media Center display.



The *My Netflix* plug-in lets you manage your queue and select new movies, all from the Media Center interface.

WebMedia. This plug-in adds Internet radio to your Media Center.

My Netflix. This one gives you a whole new way to manage your Netflix account, displaying your DVD rental queue, history, suggestions, new releases, and top 25—all within the Media Center interface.

4 Add Missing High-Def Channels

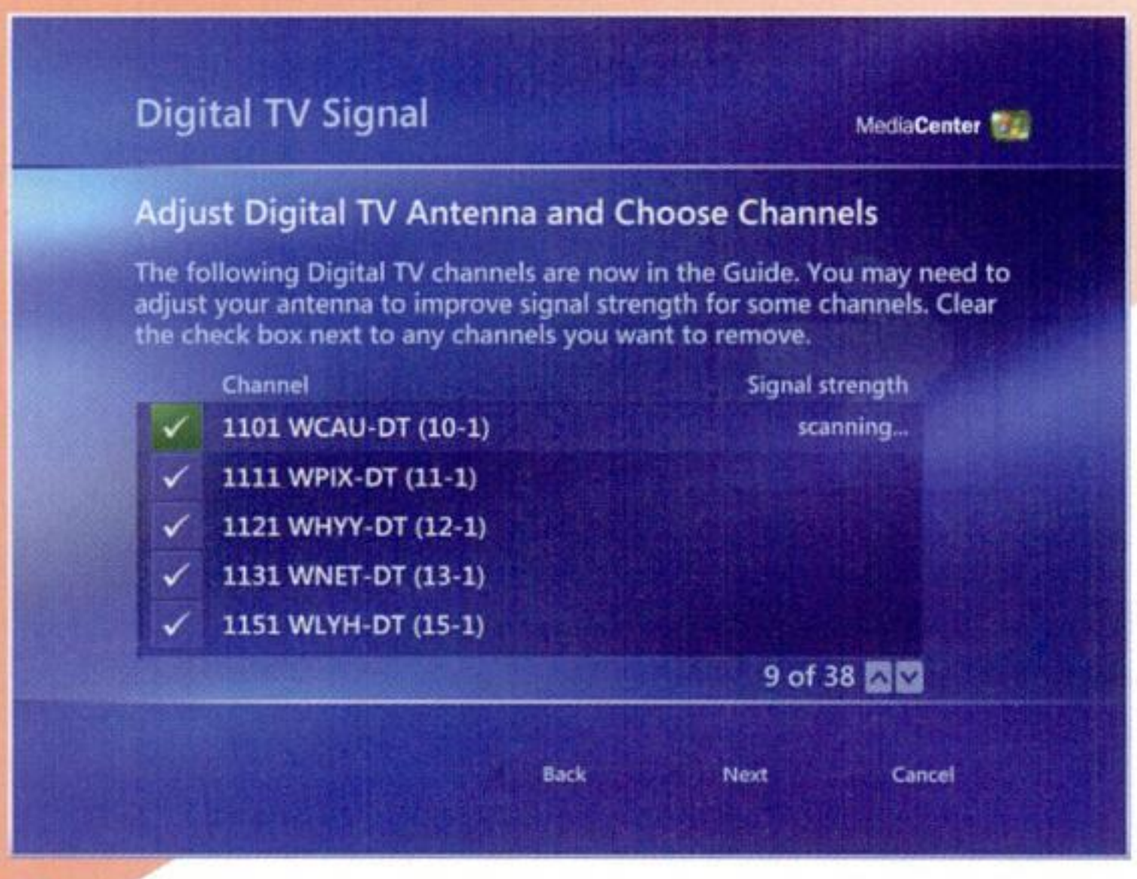
Over-the-air HDTV reception is a tricky thing. First you have to move the antenna all around to make sure you're pulling in every channel possible. Then you have to clue Media Center in on what channels didn't make it into the program guide. The digital TV setup wizard does a pretty good job of getting HDTV up and running, but it pulls the lineup information from an FCC database. Considering how thorough government work can be, it's logical to assume that a local independent channel, or two or three, has been left out of the database.

You can cross-reference this FCC database by using the National Association of Broadcaster's CheckHD site (**www.checkhd.com**) and the Consumer Electronics Association's AntennaWeb (**www.antennaweb.org**), which use your zip code to look up digital broadcasts in your area. AntennaWeb is particularly handy because it lets you know how far away the broadcast towers are, as well as which compass direction to point your antenna.

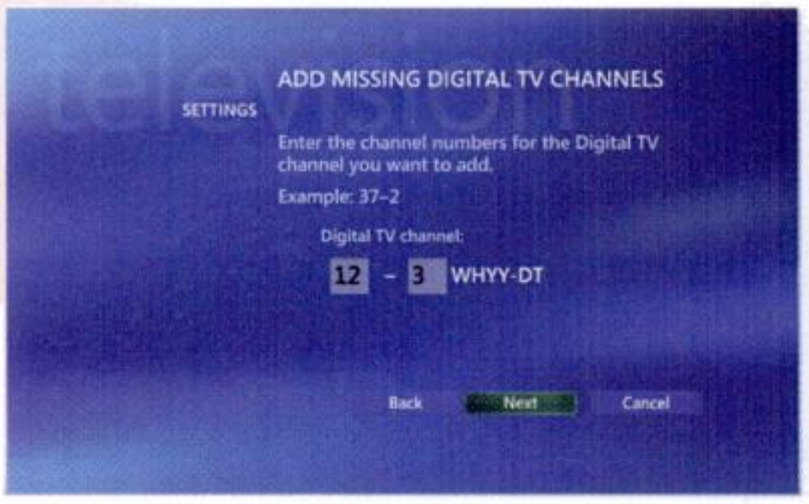
If you see a channel listed on any of these sites that you don't have in your guide, just copy down its name and the two numbers that identify it. For the record, these numbers refer to the major channel (usually the same as the local analog channel) and the minor channel (usually 1 unless the channel multicasts, which means it broadcasts multiple minor channels on a single major one). You need all three to tune in your channel. Go to Settings, Guide, Add Missing Channels, Add DTV Channel, to enter these values. To add our local ABC HD channel, for example, we would need to enter 12, 3, and WHYY-DT (see screen below).

The next time the guide refreshes, you should see the listings for your new channel. If you don't, you may need to instruct the guide to pull down local listings instead of national ones. This is a common problem with satellite TV users that don't get local channels as part of their subscription, but it can also affect cable subscribers. To build the digital TV listings, Media Center matches up the channel names with analog listings that it already knows. If it can't match the call sign, either because it isn't part of your channel subscription or it's a multicast (PBS channels are notorious for this), then it won't list anything.

To tell the digital TV guide to pull down local listings, go to Settings, TV, Guide, Set Up Guide Listings. Enter your Zip and then choose a local lineup instead of a national one from the list.



When it sets up your digital TV channels, Media Center adds the listings for your area and checks for signal strength.



If your local PBS station multicasts, you can add the extra channels to the guide manually.

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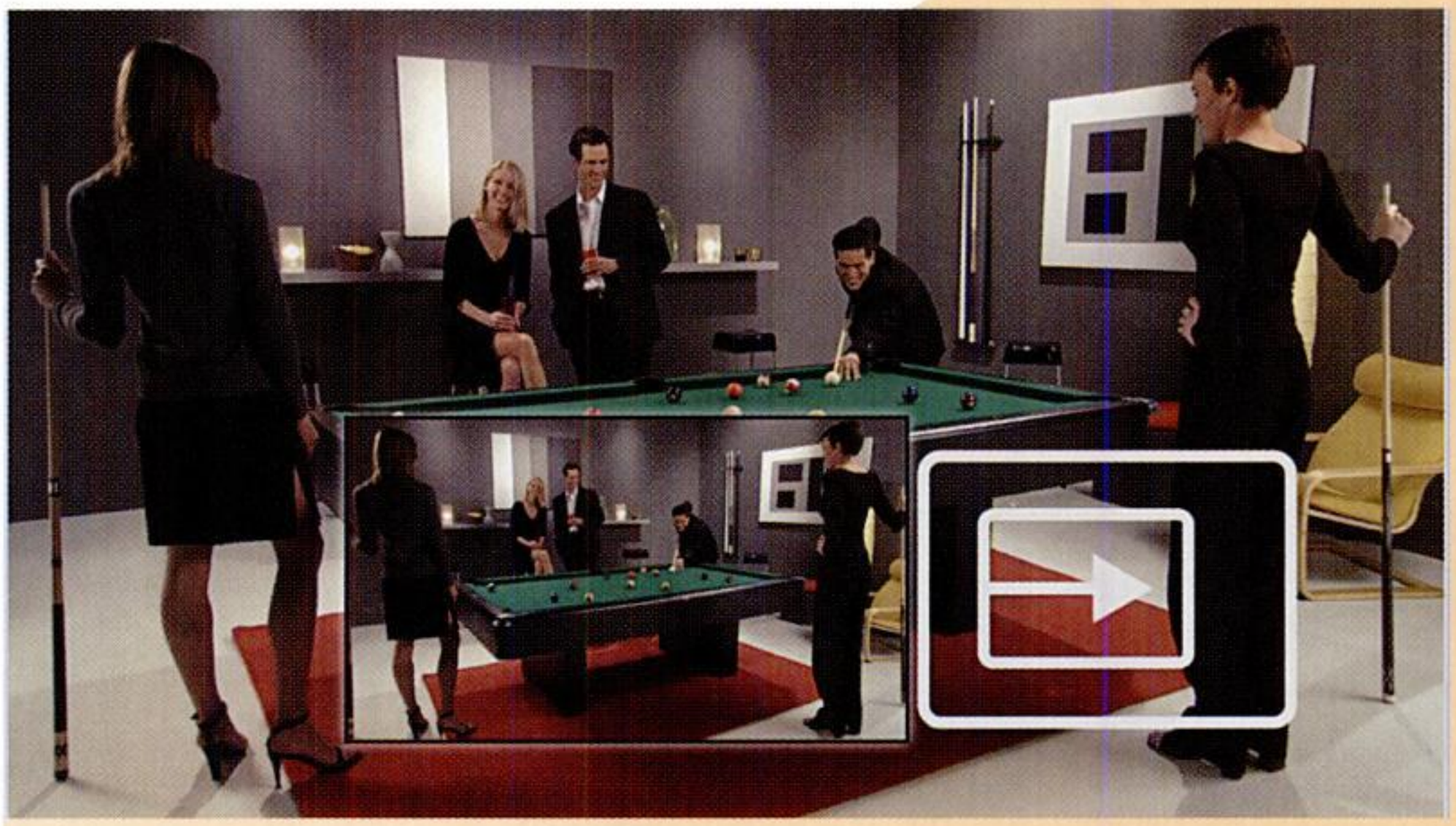
5 Fine-Tune Your Display

When it comes to image quality, you can either be satisfied with what you've got or be constantly tweaking your settings to make it better. There are plenty of people that are perfectly happy to hook up their Media Center to their old TV using S-video cables, and there's nothing we can do for them but back away in horror. The first step to improving your visual quality of life is investing in kick-ass hardware and connecting it to a kick-ass display using DVI or component cables (see our big-screen buying guide, starting on page 48). With these in hand, here are some steps you can take to stamp out the image ghosting, distorted colors, fuzzy edges, and washed-out details that may creep onto your screen.



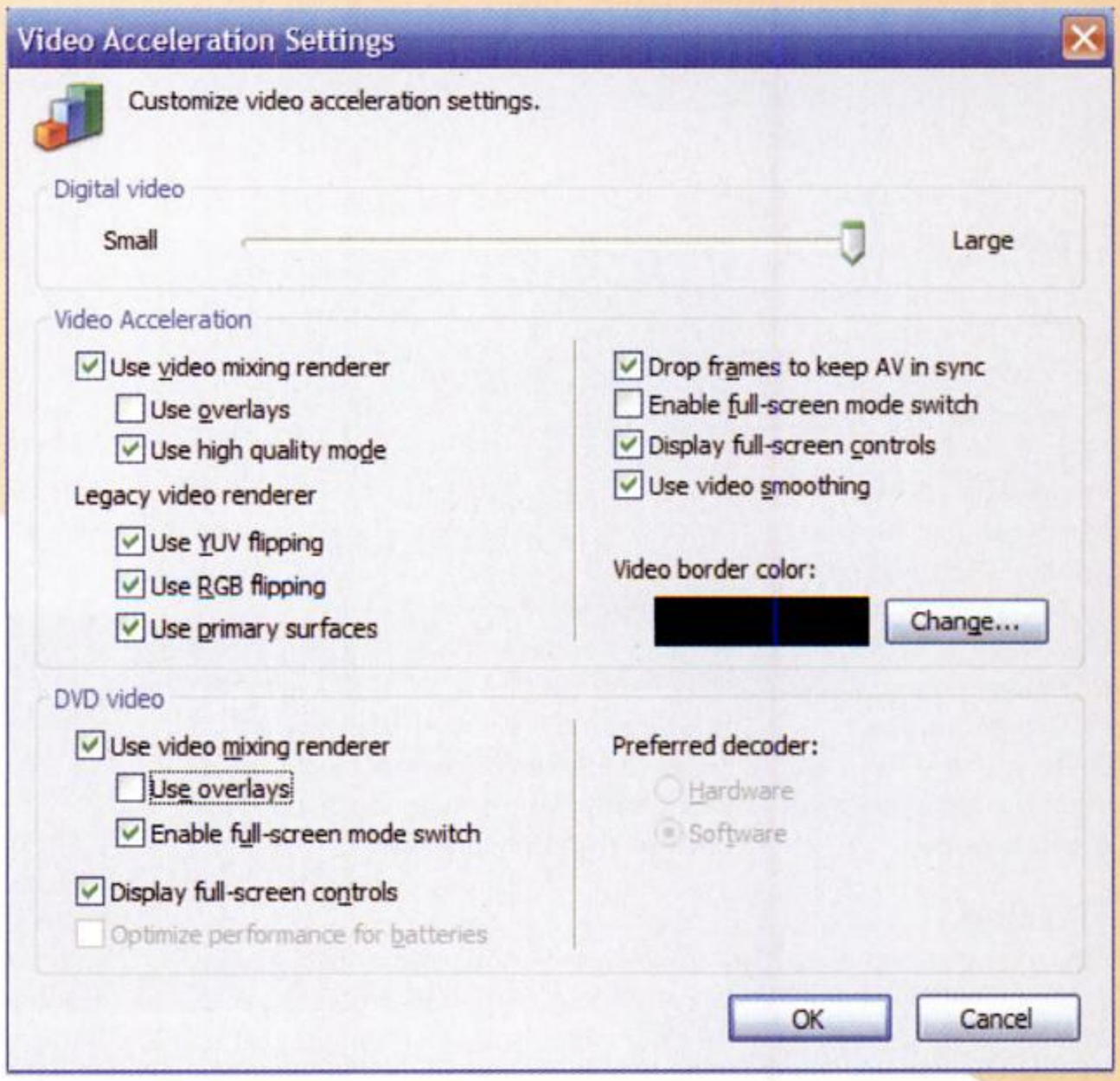
The videos are annoying, but the Display Calibration Wizard does a good job tuning your display settings.

If your picture quality isn't what you'd like, first check your connections—if the bird's nest behind your entertainment console scares you, turn to page 52 for a complete field guide on what plugs into where. Next, install the latest reference drivers for your video card. ATI (**www.ati.com**) and nVidia (**www.nvidia.com**) both have Media Center-specific drivers that you should use, and we included these on the CD bundled with this issue. Next, make sure your computer display settings are properly set up, with the correct resolution and timings, as well as balanced colors and contrasts, black levels, and sharpness. A good place to start is Media Center's Display Calibration Wizard. Yes, the "laughing people playing pool" videos are excruciating to watch, but this wizard will get rid of the most obvious problems so you can focus on specific performance tweaks.

The next thing you should check is how Windows Media Player is configured, since that's what drives Media Center's A/V system. Go to Tools, Options, Performance and make sure the Video Acceleration slider is all the way to the right before hitting the Advanced button. On this screen the Digital Video slider should be all the way to the right and the *Video Mixing Renderer* should be selected for video acceleration and DVD video. Just so you know, *Video Mixing Renderer* is a fancy way of saying "Let Direct3D handle these tasks." It renders video through your card's 3D engine instead of through the card's hardware overlay. Video overlays don't allow any post-processing functions, such as de-interlacing, and they don't work across multiple displays.

While "Use high-quality mode" may seem like the obvious choice under video acceleration, the default setting may be a better fit for video cards that do their own color processing in the overlay hardware. But if you have a bitchin'-fast video card, you should probably test out high-quality mode, since it uses your card's 3D engine to improve image quality. If your card can't handle the load, you'll notice a little stuttering during video playback. To test this out, watch a snippet of recorded TV with it turned on, then watch it again with it turned off. If you like the way that works, try the same trick with a DVD.

Your DVD software gets a pretty major workout in Media Center, since the OS turns to it for all its MPEG-2 decoding, which means playing recorded TV shows as well as DVDs. Everything from DVR-MS to AVI files needs to be fed through a third-party decoder before it hits the screen. Programs such as *WinDVD* and *PowerDVD* use different codecs, which you can tweak to improve image quality. Each one is different, but you should use the options screen in each to make sure hardware acceleration is turned on, the *Video Mixing Renderer* is enabled, and bob and weave de-interlacing is enabled. No matter what the video source, the de-interlacing process transforms it into a progressive image by using existing lines of image data to either replicate (weave) or interpolate (bob) additional lines. These settings will bring all of your hardware's horsepower to bear on improving the look of your video.



If you have the latest generation of Radeon or GeForce hardware, then your video-acceleration settings should look like this.

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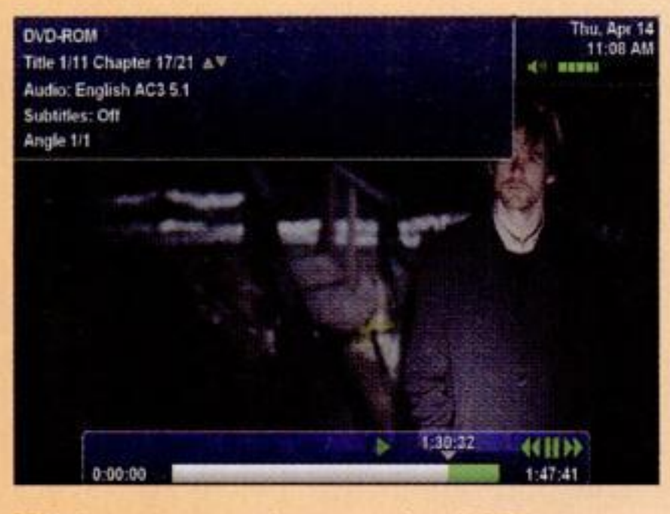
Media Center Alternatives

There are other ways to skin the entertainment-PC cat

When it comes to getting TV on your PC, Microsoft's Media Center OS isn't the only game in town. These three alternatives all have program guides and the ability to play, record, and time-shift live TV.

SageTV

SageTV is *Media Center* for the add-on crowd. *SageTV* records and time-shifts TV, organizes and displays photos, and plays music and DVDs. It can even share the content on your PC across your network. It comes as a standalone program ($80) or with a bundled TV tuner card ($180) such as the Hauppauge PVR-150. **www.sagetv.com**.



With support for music, DVDs, and plenty of slick DVR settings, *SageTV* is the best way to transform your current PC into an HTPC.

The Good

Install a $30 client on the other PCs in your home and they become instant *SageTV* extenders, streaming recorded shows and even live TV from your *SageTV* PC across your home network. Like Media Center, *SageTV* supports multiple tuners, but it doesn't get all DRM on your ass. It records video in open standards, such as MPEG-2, MPEG-4, and DivX.

The Bad and the Ugly

SageTV doesn't do high-def and has no support for over-the-air HDTV tuner cards such as ATI's HDTV Wonder. Unlike Media Center and *Beyond TV*, *SageTV* doesn't do any MPEG-2 encoding through software, relying entirely on hardware encoders built into TV cards. Also, for what it's worth, *SageTV* doesn't play DRM-protected content.

Beyond TV

Unlike Media Center and *SageTV*, *Beyond TV* doesn't step out of its television duties to give you control over the photos, music, and video files stored on your PC. It's strictly limited to doing the DVR deed. Like *SageTV* it comes in standalone ($70) and bundled ($170 with the PVR-150) versions. **www.snapstream.com**.

When combined with *Beyond TV Link*, the latest version of *Beyond TV* can send your shows wherever you connect to the Internet.

The Good

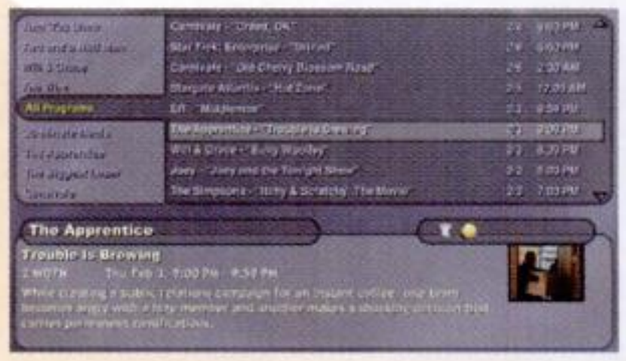
Beyond TV streams content across home networks and one-ups all the other TV-on-a-PC apps by also sending content across the Internet. That means with the right notebook or handheld and a good Wi-Fi connection, you'll never miss another episode of *Desperate Housewives*, no matter where you are. *Beyond TV* can even compress programs recorded in MPEG-2 format into WMVs that you can stuff onto a handheld. Recorded TV programs aren't DRM'd like they are in Media Center.

The Bad and the Ugly

Beyond TV doesn't support HDTV and doesn't do any other media tricks, like play MP3s or view pictures.

MythTV

MythTV is an open-source app that runs on Linux and MacOS. With the right set of plug-ins, *MythTV* can match the feature set of Media Center.



Like most open-source projects, *MythTV* is constantly in a state of development. The latest revision added interface support for high-def displays.

The Good

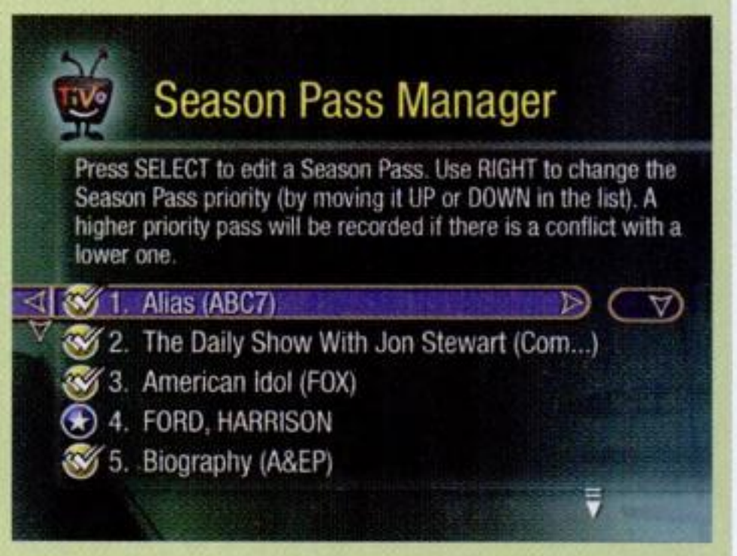
Like most things Linux, *MythTV* has lower hardware requirements than any Windows alternative, so an HTPC built using this free software can be considerably cheaper. It supports multiple tuners and even does high-def via over-the-air HDTV tuners such as the MyHD MDP-120. Like *SageTV*, it records video in open standards such as MPEG-2, MPEG-4, and DivX. It also includes tools for ripping DVDs to your hard drive.

The Bad and the Ugly

MythTV is a Linux app, so it's far from being a breeze to get up and going. It also doesn't play DRM content, but that's probably a plus to the Linux crowd.

What about TiVo?

TiVo is primarily a DVR, although it can also stream music and photos from a connected PC, and the recently introduced *TiVoToGo* feature adds some portability to the mix. However, it can be difficult to use. TiVo doesn't do HDTV or use multiple tuners by itself, but you can get these through DirecTV. The DirecTV HD DVR receives and records both broadcast and premium content such as HBO and ESPN. Media Center's HDTV support is limited to over-the-air broadcasts.



TiVo still has plenty of tricks up its sleeve that no other DVR platform can touch.

While DirecTV's HD DVR is cheaper at $1,000 for the box, its $50 monthly charge adds up pretty fast. HTPCs are much more functional, networked boxes that bring the Internet, video, and audio together into a single device. Only on an HTPC can you IM your buddies while you're watching *24*, or pause a DVD to look something up on the Web.

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Entertainment PC Autopsy

We pry open the case, expose, and explain EVERY component!

The first step in building your own entertainment PC is choosing the right components. Unlike over-clocked gaming rigs, entertainment PCs—or Media Center or home-theater PCs (HTPC)—don't have the luxury of sounding like leaf-blowers, especially if they're going into the living room. Humming fans ruin all but the most action-packed movies and disrupt your musical interludes.

Unless you want to get into esoteric liquid-cooling gear, it's best to assemble your PC using components that are designed for cool, silent operation. This will allow you to use fewer fans and, hopefully, run them at a slower, quieter setting. Consider the system spec'd out below as a guide to selecting the most entertainment PC-friendly components. (If you'd rather not go the Media Center route for the OS, you can substitute MCE 2005 with any of the alternatives covered on page 14.)

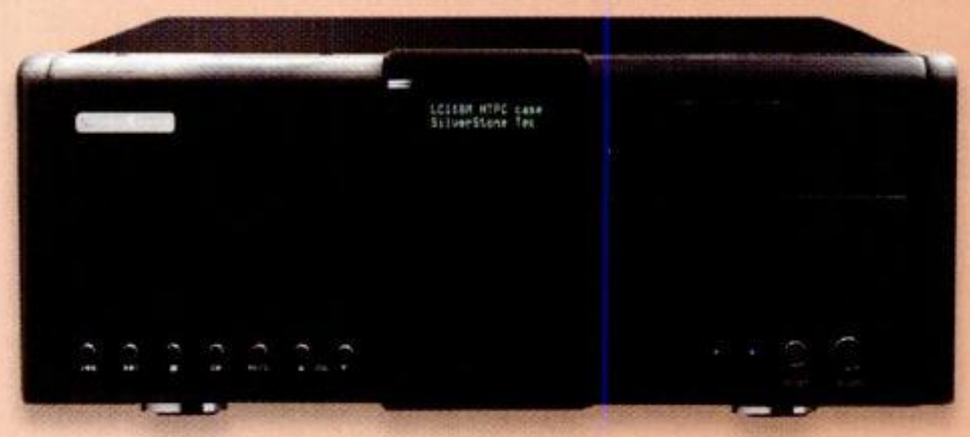
Entertainment PC Parts List

Case:	Silverstone Lascala 14M	$269
Power supply:	Antec Phantom 350	$172
CPU:	AMD Athlon 64 3500	$267
Memory:	Corsair 1GB PC3200 DDR	$90
Motherboard:	Foxconn WinFast NF4UK8AA	$104
Hard drive:	Maxtor 300GB DiamondMax 10 SATA	$200
DVD drive:	Plextor PX-716AL DVD burner	$169
Video card:	ATI Radeon X800 XL	$299
TV tuner:	ATI TV Wonder Elite	$143
HDTV tuner:	ATI HDTV Wonder	$199
Wi-Fi card:	Linksys Dual-Band Wireless A+G	$79
Keyboard/mouse:	Logitech Cordless Desktop LX 700	$59
	Windows XP Media Center Edition 2005*	$125
Total:		$2,175

Case: Silverstone Lascala 14M

If you're looking to build a PC that even your wife or girlfriend will appreciate, you can't go wrong with Silverstone's latest HTPC case. Its sleek brushed-aluminum front and A/V component-inspired vacuum fluorescent display (VFD) screams high-end home theater. This case was made to be in the living room. It comes with a programmable remote and play/pause/eject buttons built in. The LC14M's cooling system isn't absolutely quiet, but it's efficient enough to keep the CPU, video card, and power supply cool. The case accepts full-size ATX motherboards and has plenty of room inside for up to three 3.5-inch drives and two 5.25-inchers.

Cheaper alternative: Antec Overture II.



Power Supply: Antec Phantom 350

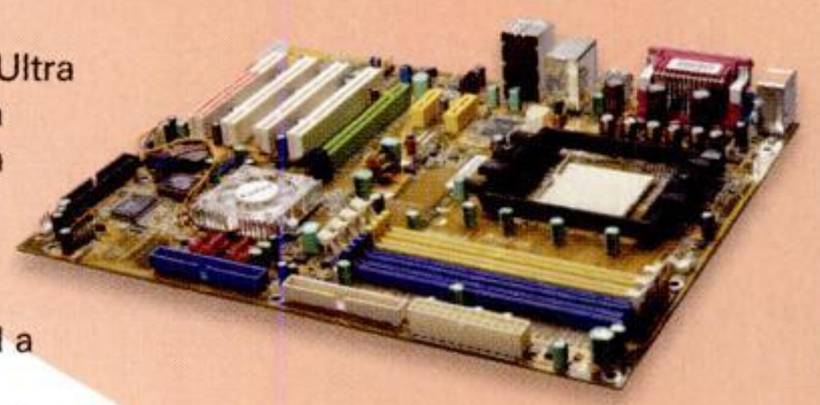
The fanless Phantom doesn't make a peep, which means it won't interrupt *Desperate Housewives* with its own dramatic noise. And its 350-watts of output should be more than sufficient to handle any HTPC tasks. However, because it's one big passive heat sink, it needs plenty of internal air circulation. If you plan on putting your entertainment PC in your living room, we can't stress enough how important it is to make sure there's plenty of room in your entertainment center around the airflow vents. Otherwise the heat will have nowhere to go but back into the case, which will eventually spell disaster for your hardware.

Cheaper alternative: PC Power and Cooling Silencer 360.

Motherboard and CPU: Athlon 64 3500 and Foxconn WinFast NF4UK8AA

When it comes to picking a processor, you want enough horsepower to handle HDTV decoding and an occasional game, but not to create 3D models of your dream home. For the right amount of "umph" you can't go wrong with an Athlon 64 3500, and nothing completes it better than nVidia's nForce4 chipset. (If you're really concerned about heat and your PC will be going into a tight, enclosed space, then consider a Pentium M CPU.) We didn't need the gaming muscle of SLI so we went with an nForce4 Ultra board—specifically Foxconn's nForce4 Ultra mobo, which received a solid verdict of 8 in our May issue's mobo roundup. For just over a hundred bucks we got four SATA II connectors, RAID, gigabit Ethernet with chipset-level firewall, 7.1-channel audio, and a coax SPDIF.

Cheaper alternative: Pentium 4 and ATI Xpress 200 motherboard. ▶



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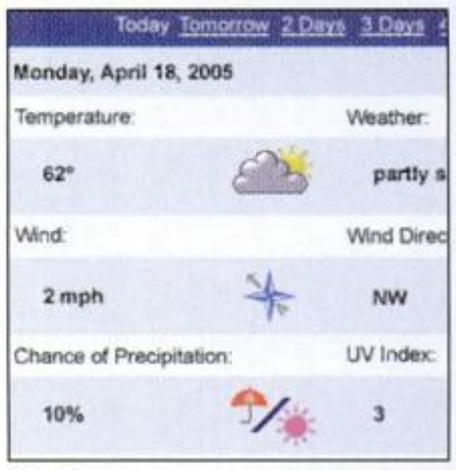

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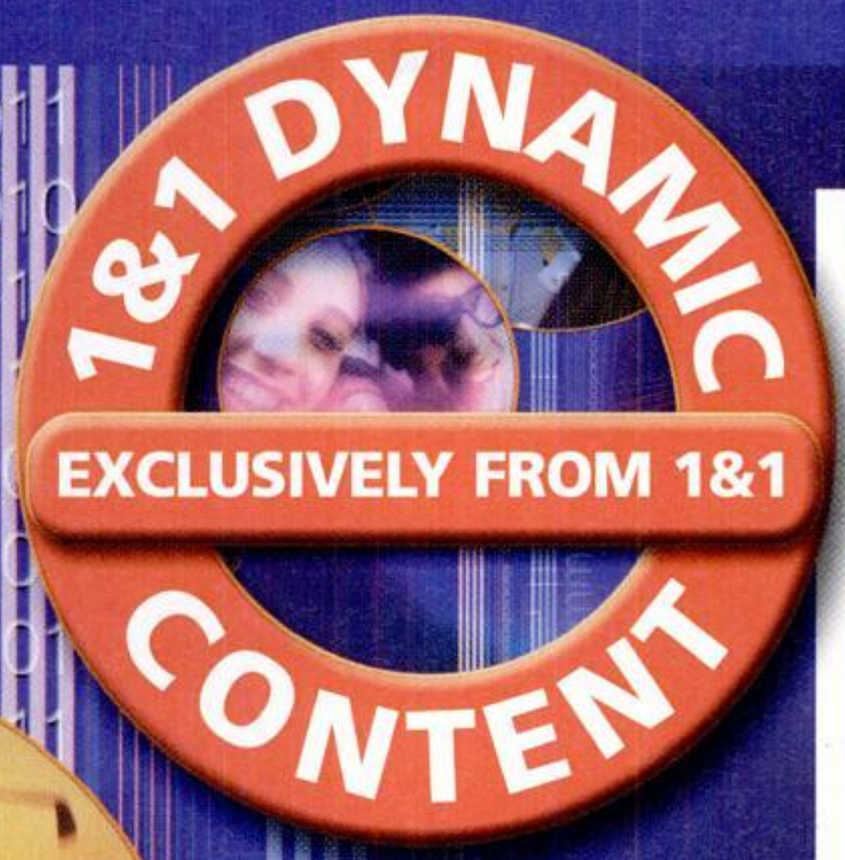

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CGI library	✓	✓
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Subdomains	10	10
Run multiple independent sites	✓	✓
Full DNS management	✓	✓
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Aliases, auto-responders, forwarding	✓	✓
1&1 WebMail	✓	✓
Spam filtering for all accounts	✓	✓
Virus protection for all accounts	✓	✓
SECURITY FEATURES		
Protected by up-to-date firewall	✓	✓
Daily backups	✓	✓
Password protected directories	✓	✓
Dedicated SSL Certificate	optional	optional
SUPPORT		
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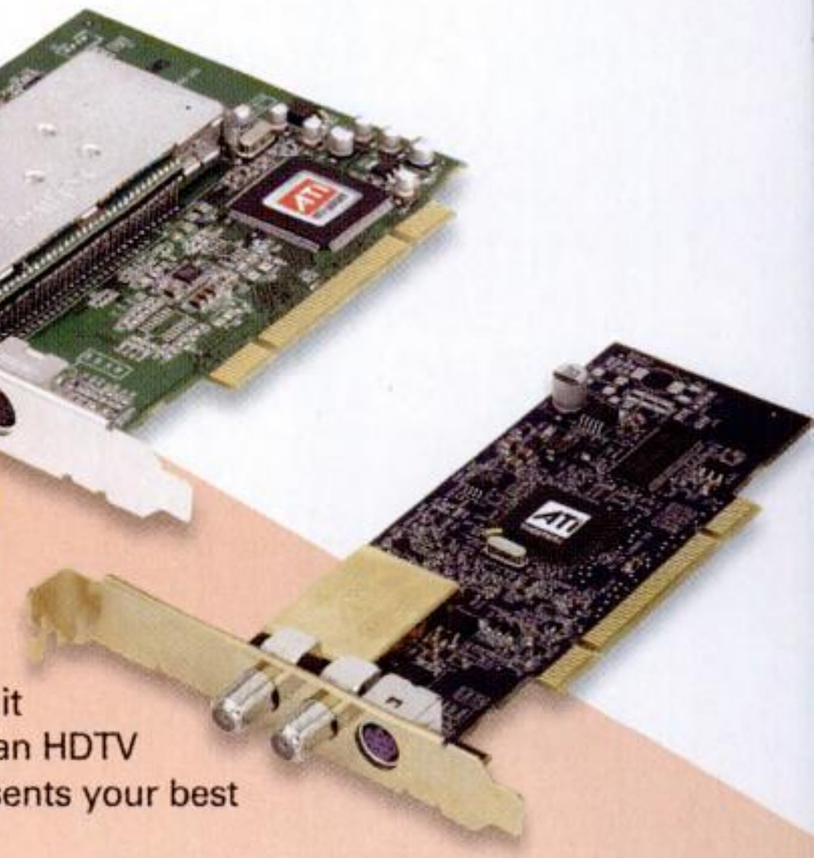
Entertainment PC Autopsy

Video Cards: ATI Radeon X800 XL, ATI TV Wonder Elite, ATI HDTV Wonder

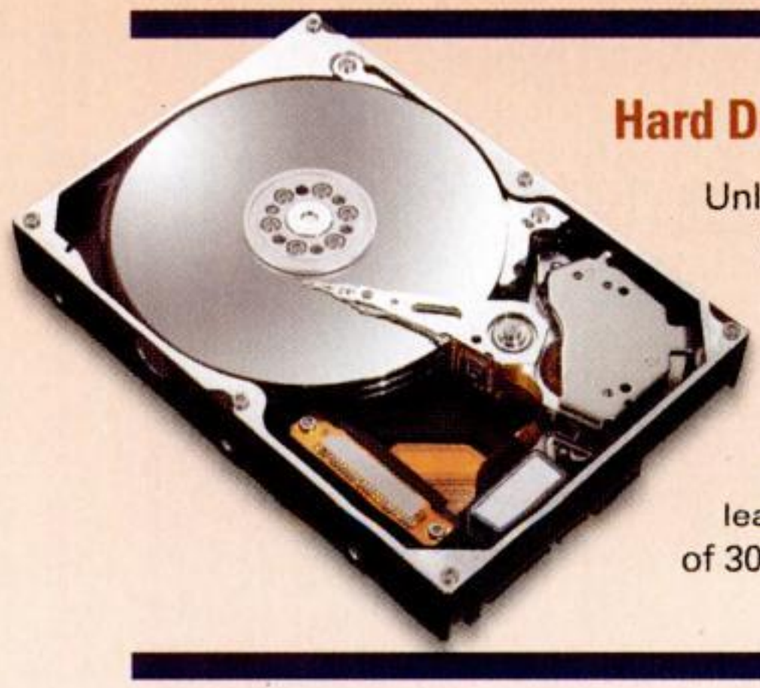


While it would be nice to use just one card to do all of an entertainment PC's TV and video chores, the software-based analog tuners on the All-in-Wonder and the HDTV Wonder don't work with Media Center 2005. Windows Media Center requires hardware-based TV tuners, so the software-based tuners that these cards use just don't cut it. Fortunately, ATI's TV Wonder Elite comes armed with a superb hardware tuner that works hand-in-hand with the other two ATI cards to deliver the best image quality possible.

As the only tuner with an MPEG-2 encoder and TV decoder on a single chip, ATI's TV Wonder Elite delivers crisp details and vibrant colors, as does the HDTV Wonder, which uses the same digital tuner and high-def decoder chip found in a number of HDTV set-top boxes. The HDTV Wonder only does over-the-air HDTV reception, however, so you won't be able to use it to watch HBO or ESPN HD. Both cards do a bang-up job on video, using noise-reduction algorithms as well as adaptive comb and anti-aliasing filters.

The real picture-moving chores are left to the X800 XL, a lower-clocked version of the impressive X800 XT Platinum. It's powerful enough to handle anything Windows Video Mixing Renderer (see Media Center Tips and Tricks, page 13, for more on the VMR) can throw at it, but not so powerful to require a massive cooling fan. The X800 XL is also not too shabby when it comes to 3D games. Until ATI makes an HDTV All-in-Wonder, this trio of cards represents your best option for top performance.

Cheaper alternative: GeForce 6600 GT video card, eVGA NVTV tuner, and AVerMedia AVerTVHD tuner.

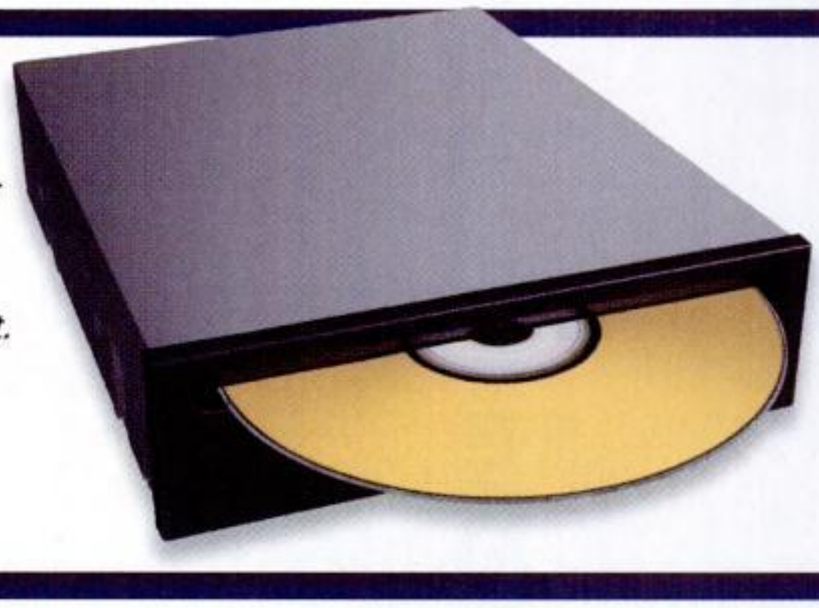


Hard Drive: Maxtor 300GB DiamondMax 10

Unless you plan on one-upping the Xbox, the main focus of your Media Center is going to be storage and video encoding/decoding, so you'll want to pay particular attention to your hard drive. You want it fast and you want it "ginormous." We're talking 7,200 RPM and at least 250GB of capacity. There are a number of 300GB drives out there that meet this profile, but we've taken a liking to Maxtor's DiamondMax 10. It sports a 16MB onboard buffer and a density of 100GB per platter, which translates into massive sequential reads and ultra-low seek times. Did we mention that this drive is also whisper-quiet? We couldn't love it more unless it was wearing hot pants.

Cheaper alternative: Seagate Barracuda 200GB 7200.8 SATA.

DVD Burner: Plextor PX-716AL DVD burner



The slot-loading version of Plextor's Kick-Ass award-winning dual-format, double-layer DVD burner is all the optical your entertainment PC will ever need. It burns an 8.3GB double-layer disc in less than 20 minutes. Depending on the recording quality, that's enough room for a season of *Simpsons* episodes with a side of *Arrested Development.* The included software makes it easy to make sure every disc you burn can be read by any of your buddies' DVD players.

Cheaper alternative: TDK Indi DVD Multiformat

Keyboard, Mouse: Logitech Cordless Desktop LX 700

This wireless keyboard has great range (around 20 feet) and is programmable, so you can use it to switch from music to DVD to TV when you can't find the remote. Unlike most optical mice, the MX1000 Laser mouse can be used on all sorts of surfaces and still provide smooth performance like butter.

Cheaper alternative: Gyration Media Center Remote and Keyboard (see review, page 46).

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Build Your Own Media Center PC!

Sure, buying off the shelf is easy, but it's expensive and not nearly as much fun as doing it yourself! We explain every step of building your own entertainment PC—from scratch, just like Mom.

If you're like us, you've been eying your entertainment center, itching to soup it up somehow and cram it full of PC hardware. Things are changing so fast on the home-theater front that a home-built PC is really the best way to stay ahead of the game. Every few months bring updated high-def resolutions, new surround-sound audio standards, and revisions to high-def DVD formats, and all of this requires hundreds of dollars worth of A/V hardware upgrades. Or, if you put together your own HTPC, adding a must-have home-theater technology, such as Blu-ray, is as simple as swapping out your old DVD burner.

If you've ever built a PC from scratch, then building a Media Center PC is pretty straightforward. For the sake of this how-to, we're assuming you're familiar with PC-building basics, and so we're going to limit ourselves to explaining how to build a Media Center using the parts listed in our Autopsy story on page 15. If you're interested in even more thorough instructions, the Build It feature in the reprints section of **www.maximumpc.com** walks you through the process of building a PC in extreme detail. We also recommend that you take the time to read the manual that comes with your mobo before beginning, so you're familiar with how it works and where its important connections and jumpers are.

Now, let's roll up our sleeves and get started!

Besides the list of products on page 15, here are the tools you need to build a Media Center:

1. Philips screwdriver
2. Drivers for all of your hardware, especially your motherboard
3. Windows XP Media Center Edition 2005 (or WinXP or Linux if you prefer) we're going to use Media Center in this how-to
4. DVD decoder software
5. A sheet of paper with the model information of every component
6. A clean, non-conductive surface

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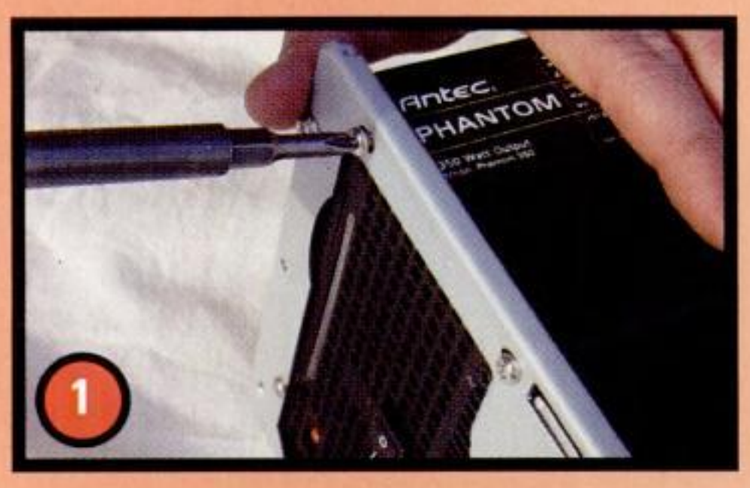
DANGER

Read Before Proceeding!

Before we start, here's a friendly little reminder to guard your hardware against static electricity. It is a major hazard when it comes to PC building, so be sure to ground yourself before touching sensitive PC parts such as your motherboard and CPU. Make a habit of touching your metal case before you lay your hands on anything and you should be fine.

Step 1:
Install the Power Supply

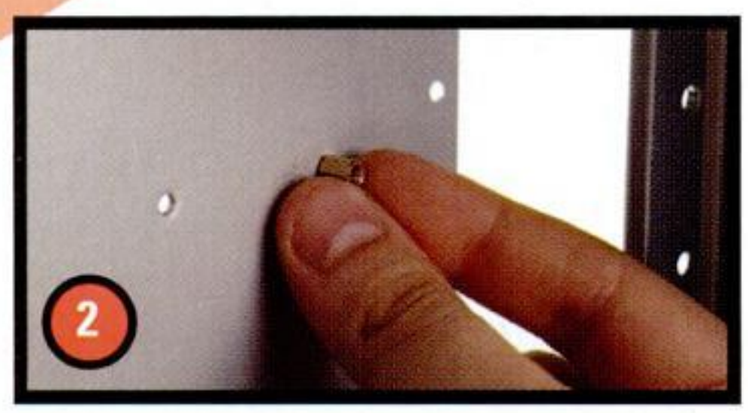
The Silverstone LC14M didn't come with a power supply, which makes it easy to add the Phantom 350. This case is pretty spacious, so dropping in the power supply and attaching it to the support bracket on the back is a snap. While you've got your hands inside, you should also install the metal I/O backplate that comes with the motherboard.



While the fanless Phantom PSU is plenty quiet, it can get plenty hot without enough airflow—make sure your HTPC has room to breathe!

Step 2:
Mount the motherboard

The case comes with some motherboard standoffs already in place along the back edge. You can find where the others should go by placing the motherboard over the existing standoffs and noting which holes line up with the ones on the bottom of the case. While you're lining it up, make sure the motherboard's rear connectors match up with the holes in the I/O backplate you installed in the previous step. Now, screw down the motherboard before it gets away.

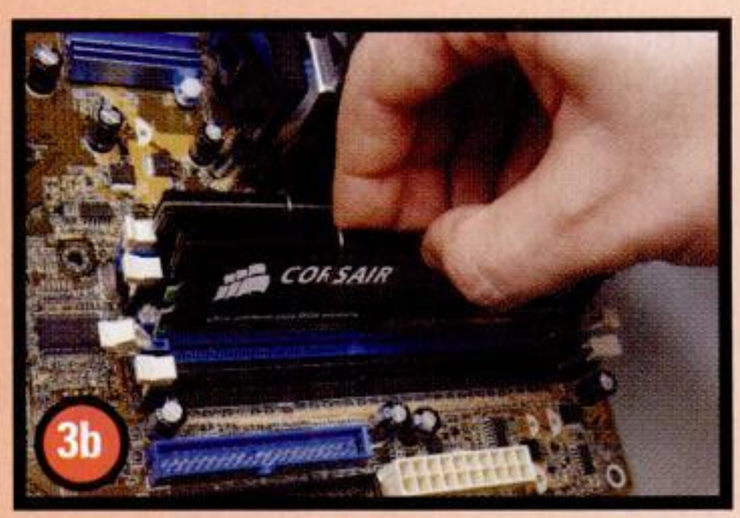


Each standoff needs to line up with a hole in the motherboard.

Step 3:
Drop in Your CPU and RAM

Make sure the Athlon is correctly oriented before you insert it into the 939 socket.

This Zalman cooler comes with a controller that lets you dial down fan speed for silent running.

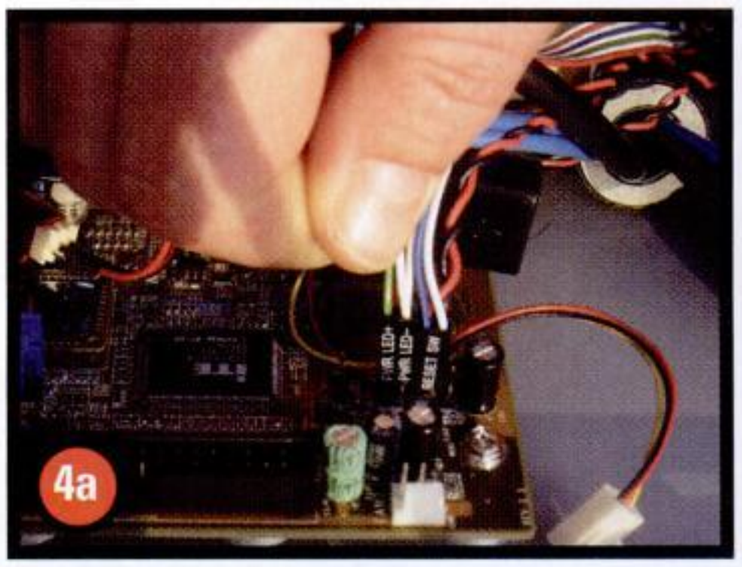


DDR DIMMs snap into the motherboard slots only one way, so don't try to force them if they don't want to go in.

Unless you want to bend some CPU pins, look for the marked corner and line it up with the mark on the socket. Double-check that all the CPU pins are sitting flush with the socket before locking it in place with the lever. Be gentle—do not force anything in this step! Next, add a dab of thermal paste to the top of the CPU, spread it around with your fingertip, and plop the heat sink on top. We used a Zalman CNPS7000B-Cu fan for our cooling tasks. Once you snap in your DDR DIMMs, you're ready to fiddle with some switches.

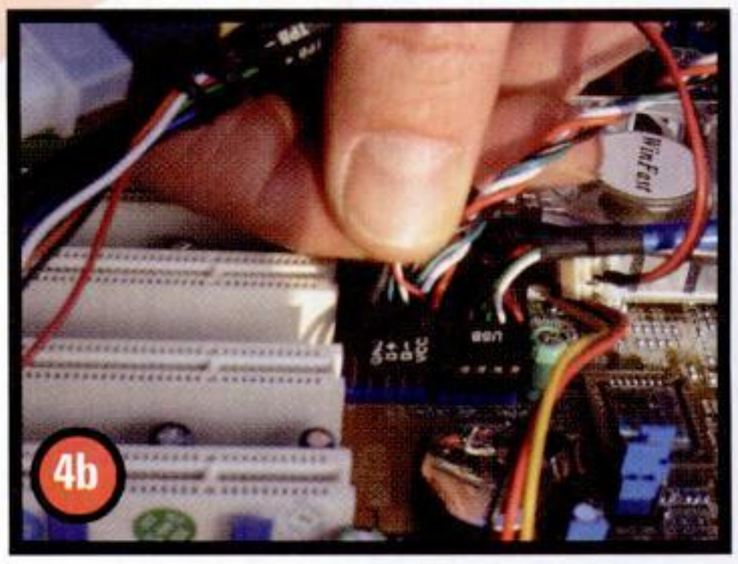
Step 4:
Set Up Your Switches

This is where you *need* to crack open your motherboard's manual—actually, as we've already noted, it's good to do this *before* you start building—to figure out where the case buttons and lights connect to the motherboard. The front panel of the LC14M contains a Soundgraph vacuum fluorescent display (VFD) /Infrared (IR) module that



The tricky part of getting the case lights and switches connected to the motherboard is figuring out which pin is positive and which one is negative. For the record, the positive pin is almost always labeled.

must be in the power switch loop, so you'll need to connect one wire from the front panel to the power switch and another to the mobo. This module draws power from a 4-pin connector coming out of the power supply, and it connects to one of the motherboard's USB headers. The case's hotkey unit (the play, pause, and eject buttons) needs to connect to the other set of USB pins. Note: With these taking up two USB headers on your motherboard, you're only going to be able to connect two of the four USB ports on the left-hand side of the case's front to the mobo, which should be fine to meet your needs.



The case wires for the VFD/IR module and the hotkey unit need to plug into the motherboard's USB headers.

Step 5:
Connect the PSU!

The power supply connects to the motherboard in three separate spots: the big ATX power connector, the smaller auxiliary power Molex connector, and the square ATX 12V power connector. Once those are all in place make sure you have all the case fans plugged into either the motherboard or the power supply. Our nForce4 Ultra board only has three fan connectors, and one of them was being used by the chipset fan, so we had to use a three-pin to four-pin adaptor to hook up the extra fan.

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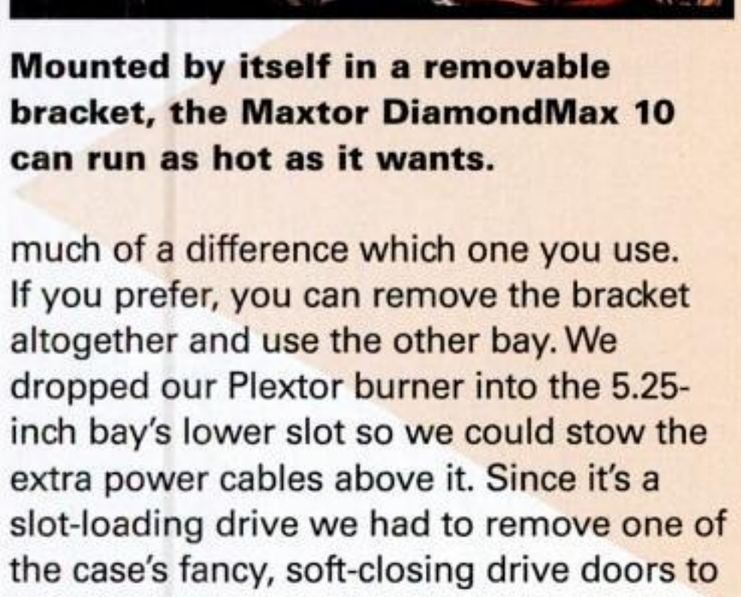
The twenty-four pin ATX power connector can only plug into your motherboard one way.

Step 6:
Mount the Drives

The LC14M has two 3.5-inch bays where you can mount the hard drive; one is tucked underneath the 5.25-inch drive bay and the other is a removable bracket. We used the bracket because it provides better airflow, but it shouldn't make that much of a difference which one you use. If you prefer, you can remove the bracket altogether and use the other bay. We dropped our Plextor burner into the 5.25-inch bay's lower slot so we could stow the extra power cables above it. Since it's a slot-loading drive we had to remove one of the case's fancy, soft-closing drive doors to get it to work properly, which was a simple matter of removing three screws.

Mounted by itself in a removable bracket, the Maxtor DiamondMax 10 can run as hot as it wants.



With one of the drive doors removed, the slot-loading Plextor can work its magic without a tray.

Step 7:
Install the Add-in Cards

When you install the video card, TV tuners, and Wi-Fi card, be sure to maximize the airflow from the X800 XL's cooling fan. Since we had four PCI slots to work with, we left the one next to the video card empty and put the HDTV Wonder in the outermost slot so it could have a little cool-down space as well.

The videocard and HD tuner benefit the most from the extra airflow.

Step 8:
Hook Up the Display

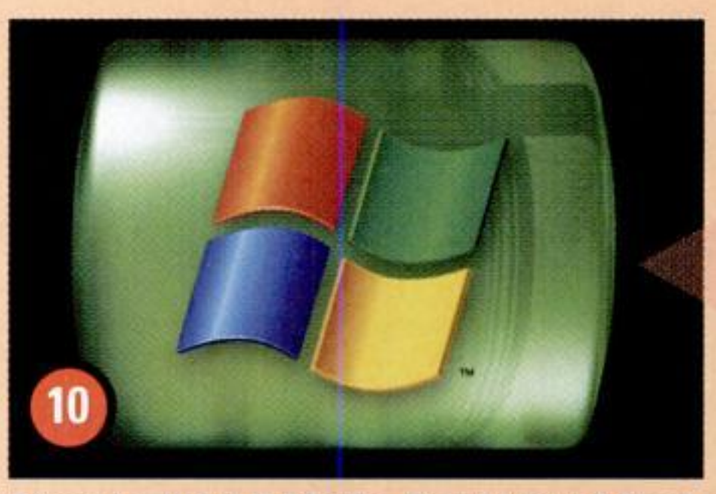
There are several ways you can connect your PC to your display: DVI, component, S-Video, and even a standard VGA connector. If your display supports it, you'll get the best results from a DVI connection. To go the component route, you're going to have to pick up an HDTV component video adaptor, which comes in DVI and VGA flavors. We used the DVI version to connect our Media Center to our HDTV's component inputs. Before we did, however, we made sure to set the dip switches on the adaptor to all the resolutions that we knew our TV could support. You can't expect to boot up in high-def, so make sure the 640p dip switch is flicked on.

This component adaptor takes DVI output and routes it through each component cable.

nTune can monitor your motherboard within Windows and present several performance optimizations.

Step 9:
Boot into the BIOS

That's right, it's time to power on! The first time your computer starts up you should enter the BIOS to change a few default settings, which you normally do by hitting the Delete key. Start by disabling the floppy and any legacy ports (parallel, serial, etc.) you don't plan on using. This isn't the time to tweak your clock speed or memory timings; you need to establish a stable environment first. You can then go back into the BIOS later and do this if you wish. Besides, the NF4UK8AA's BIOS isn't all that feature-rich, so you're better off using nVidia's *nTune* ultility to do your fine-tuning. Before you exit, you'll want to set your BIOS to boot off the hard drive first, and then look for a CD or DVD to boot from next. This way you can boot from the Windows XP install disc until your hard drive is ready to go.



Time to install Media Center and find out what the Green Button is all about!

Step 10:
Install Media Center 2005

With the hardware in place, it's time to install Windows XP Media Center Edition 2005. It comes on two install CDs: one holds all the Media Center files and the other holds Windows XP and Service Pack 2. The second one is bootable and will take you through a standard WinXP install. This includes partitioning and formatting your hard drive, as well as configuring your network. Midway through the process, the setup program will ask for the second CD. When it's done copying files from that one it will ask for the

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The first thing you should do when you're able to connect to the Internet is go to Windows Update and choose a Custom Install.

first one again so it can install the service pack. Efficient, we know.

Step 11:
Install drivers

As soon as Windows is up and running, you should install your motherboard's chipset, Ethernet, and audio drivers, rebooting after each installation. At this point we also installed the drivers for our Wi-Fi card so we could go online and use Windows Update. When you launch Windows Update, make sure you choose the Custom Install option so you can also install the optional software updates, particularly the one for HDTV support. When that's done, install the drivers for the Radeon X800 XL. We used the version of the MCE 2005 drivers that includes the Catalyst Control Center because it makes it easy to fine-tune our HDTV display settings. If you want to use that version too, make sure to install the Microsoft .NET framework from the Windows Update site first, because the Control Center requires .NET to work properly.

ATI's catalyst drivers let you define custom resolutions for an HDTV monitor.

Step 12:
Install More Drivers

Now, you need to install the drivers for the TV Wonder Elite and install the DVD decoder software you plan on using with MCE. Media Center requires a third-party DVD decoder since it doesn't come with its own. You can choose from a number of low-cost decoder packs at **www.microsoft.com/windows/windowsmedia/windowsxp/buypacks.aspx**, or you can install DVD playback software such as Cyberlink's *PowerDVD* or InterVideo's *WinDVD*. Once you complete these two steps, reboot and install the MCE drivers for the HDTV Wonder that you've downloaded from the ATI web site (**www.ati.com**). Do not use the drivers on the install CD—they aren't guaranteed to work with Windows Media Center.

Step 13:
Set up the VFD

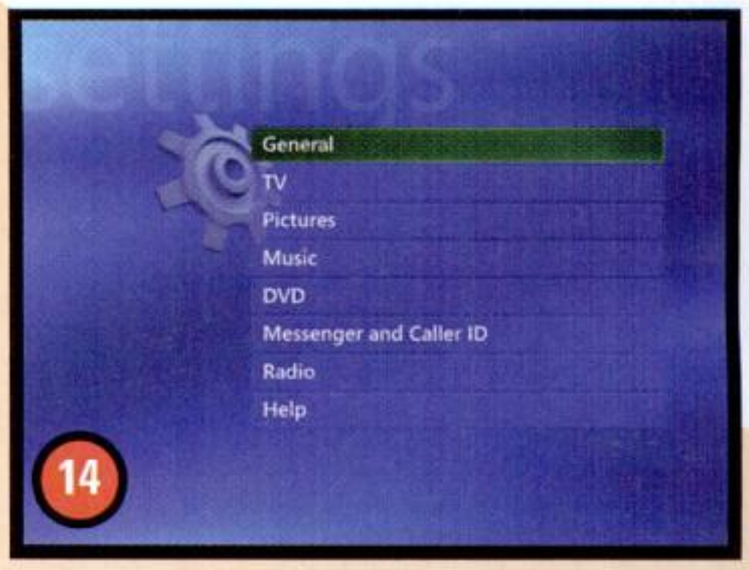
The VFD/IR module uses Soundgraph's *iMon* software to receive remote-control signals and pass information to the front-panel display. The control interface is a little clunky, but it's pretty easy to map new remote-control functions to keyboard shortcuts. What's really slick about this software is the VFD Control Panel that loads with it. This little app feeds lines to the front-panel display, either by showing what's currently playing in Media Center or WinAmp, or by supplying content it pulls together on its own. With this Control Panel you can have the VFD display a regular news feed, e-mail messages, and even information on how your PC is performing.

The let-down in all of this is the *MultiMedian* software, which is part of the Soundgraph package. It's just another media player that duplicates much of Media Center's functionality without any of its powerful features. You don't really need to install it to get the remote and the VFD to work. The first time any of this software launches you'll be prompted to download the latest patch from Soundgraph's web site, which you should definitely do to get the latest bug fixes and feature updates.

Soundgraph's *iMon* software makes it easy to customize how you navigate through Media Center using the remote.

Step 14:
Configure Media Center

Now we're ready to dive into the Media Center interface. The first time you start it up, Media Center will set up your Internet connection and your TV tuners. The wizard will walk you through the process of configuring your analog signal, downloading a program guide, and then configuring your digital signal. You should also walk through the Display Calibration Wizard to make all the proper display adjustments.



If you want Media Center to automatically start up every time Windows boots, you just need to check a box in the General settings screen.

Step 15:
Pat Self on Back!

That's all, folks—you can take it from here all by yourself. Start playing with Media Center while basking in the joy that comes from successfully building your own PC!

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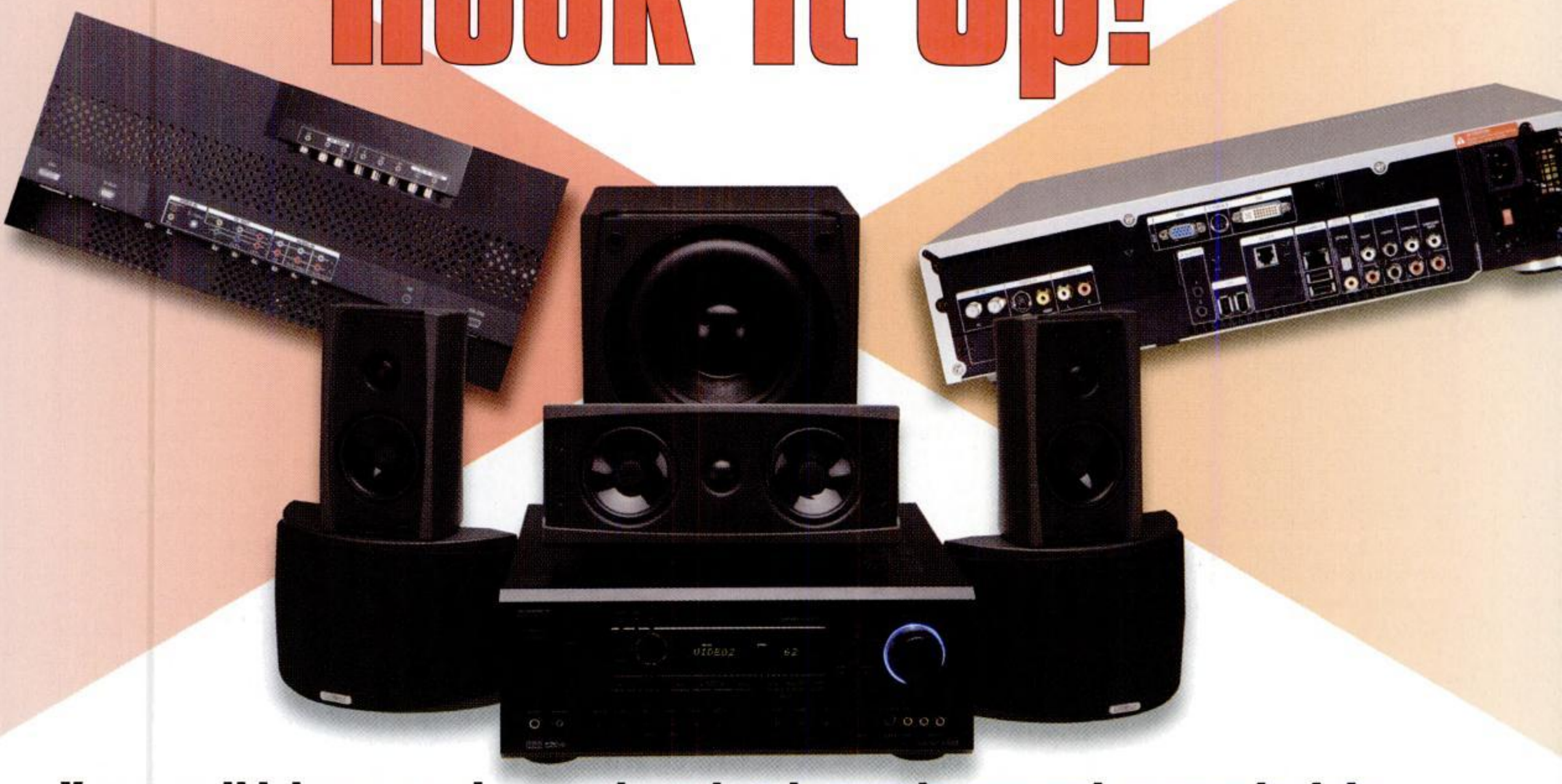
Hook It Up!



You may think you need an engineering degree to connect your entertainment PC to all of your home theater equipment. Not to fear—all you need is Maximum PC and this handy guide!

Every entertainment center is different, housing innumerable combinations of TVs, receivers, and tuner boxes. With this in mind, there is no absolute correct way to get all this hardware to work properly with your HTPC. There are just too many combinations to cover every scenario. However, there are a few things to keep in mind to get the best image and sound quality, as well as achieve absolute control over every item stuffed into your home entertainment console. Follow this hookup guide to forge a strong relationship between your HTPC and your A/V equipment.

The Audio Connection

Face facts: you'll never get the kind of sound you need in your living room out of PC speakers. Don't get us wrong—there are plenty of great PC speakers out there, and we wouldn't be caught dead in the creepy environments of *Half-Life 2* without them. Unfortunately, none of them are designed to fill the living room the way a dedicated A/V receiver and a set of surround-sound speakers can. PC speakers do a fine job filling small spaces with a lot of sound. But the more square feet they have to cover, the more they're going to wimp out. (See our PC speaker and home-theater speaker head-to-head on page 30 for all the evidence you need.)

If you're doing home theater properly, you need to use a surround-sound receiver that takes your HTPC's digital audio output, either coax or optical, and feeds it to at least five satellites and a subwoofer, which is known as 5.1 audio. A good surround-sound receiver supplies enough amplifier power (80 watts per channel is a healthy number to look for) to keep the sound distortion-free when you crank up the volume, while keeping the signal strong enough to keep its quieter moments "hiss"-free. PC speakers just don't come close in this regard when it comes to home theater use.

This is why we did not connect the system we built on page 19 to wimpy PC speakers. Instead, we connected the coax SPDIF output on the back of the PC to the input of our Yamaha surround-sound receiver. Then we routed both the analog and digital signals out the single SPDIF connection using nVidia's *NVMixer* utility. If you plan on doing a lot of gaming on your HTPC, then you should definitely be forewarned that this setup does not deliver surround effects with games. For that you need a soundcard that can output to Dolby Digital, like a Creative Sound Blaster Audigy 2 (to learn why, see story on page 28). However, the setup we used worked great for surround-sound effects in DVDs.

Unless you're interested in DVD-Audio, your surround-sound receiver needn't be that expensive. It needs to be able to decode the Dolby Digital and DTS soundtracks found on DVDs and accurately re-create all the surround-sound effects. These days, most of your typical off-the-shelf consumer-level receivers will do all of this, and more. If anything, you should sink more of your money into a set of solid speakers. The $1,300

Digital audio can be transported from your PC through an optical or a coax cable.

receiver/speaker package we review on page 31 represents a good value and solid starting point for reference.

Video Resolutions

Connecting your HTPC to your TV and getting the desktop display settings correct is guaranteed to be your biggest source of frustration. Unlike computer monitors, just about every TV, whether high-def or not, supports a wildly different set of resolutions. Sure, they do 640x480 (480p in

Fine-tune your display settings to make sure Mr. Pitt looks as pretty as possible—your significant other will thank you for it.

TV lingo) and 800x600, but if you go any higher, you could be in for a long night. Just because that mondo-expensive HDTV you just bought can handle 720 horizontal progressive scan lines (720p) and 1,080 interlaced ones (1080i), doesn't mean your PC knows how to feed the proper signal to it. More often than not, the videocard will output a given resolution at a refresh rate that sends your desktop off the edges somehow—at the top and bottom or, more commonly, on the left and right. The latest drivers from nVidia and ATI include tools that help adjust the card's output to get everything to fit on the display, but they only go so far. From there you can use a utility like *Powerstrip* to perform more substantial tweaks. Be careful when using this utility, though, because it doesn't provide the same kind of safeguards that ATI and nVidia's display drivers do, especially when it comes to allowing you to set refresh rates that your TV may not be able to handle. While you might get a great image in the short run, you could be doing long-term damage to your TV.

If you aren't going to run HDTV on your Media Center, then fine-tune your lower resolutions and leave the HDTV settings be. If you want all the riches of HDTV, then you're going to have to dive into your advanced display settings and customize the standard HDTV resolutions like we mentioned above. Just get ready for a lot of trial and error. The Zenith HDTV we connected our Media Center to wasn't able to handle standard PC resolutions like 1024x768, but our 42-inch plasma took them on like a pro. It's a good idea to crack open the owner's manual for your TV to find out exactly what resolutions and refresh rates it supports. If you have a plasma or LCD display, you should find out its native resolution and set your videocard to that. These displays will automatically "scale up" any lower resolution you select.

You can tweak the settings of the NVDVD decoder, while a DVD is playing, by right-clicking the nVidia logo in your system tray.

Up-Convert Your DVDs

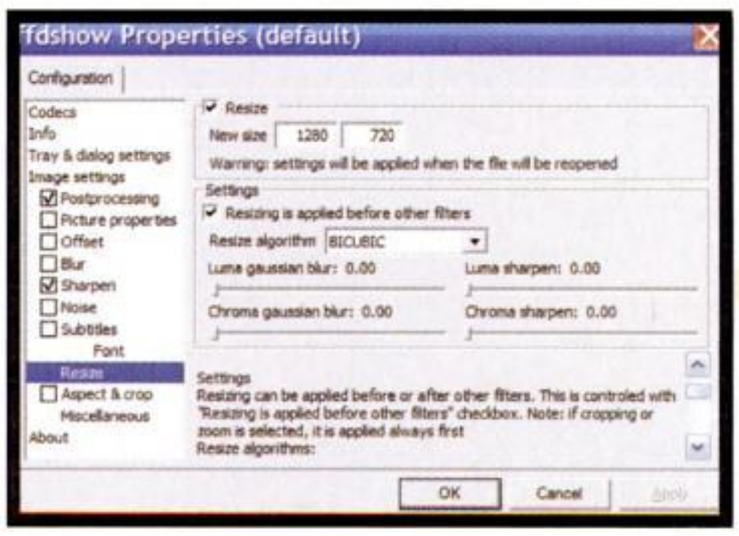
When you finally have your HDTV just the way you like it, you might get the urge to have your DVDs run at the same high-def resolution as your TV programs. DVDs play at 480p resolution by default, but you don't have to live with that. There is a great little open-source codec, named *ffdshow* (**ffdshow.sourceforge.net/tiki-wiki**), that up-converts that 480p resolution to true high-def, but it requires a lot of patience to use. It works by post-processing the image data to clean it up (remove digital artifacts/noise) and then convert it to 720p or 1080i. *ffdshow* doesn't work with Windows Media Center (but *SageTV* supports it) and it isn't supported by every piece of DVD software out there (most notably *WinDVD* and *PowerDVD*, which are the two most popular). However, when it's combined with the right software, *ffdshow* yields some amazing results.

Three such DVD software packages are Sonic's *CinePlayer* (**www.sonic.com**), nVidia's *NVDVD* (**www.nvidia.com**), and *TheaterTek DVD* (**www.theatertek.com**). All three allow you to re-direct many of the image-processing tasks through *ffdshow*. If you're interested in doing a little up-converting at home, you can download a trial version of *NVDVD* (**www.nvidia.com/object/dvd_decoder.html**). Because *NVDVD* is just a decoder and not a full-fledged player, you'll also need to download a front-end for it. We like *Zoom Player Pro*, which is a "roll your own" media player with a highly configurable DVD front-end that works with both *NVDVD* and *ffdshow*. You can download a trial version at **www.inmatrix.com**.

After you have all three programs installed, launch *Zoom Player Pro*. It defaults to media mode but you can switch to DVD mode by hitting F10. Open the option page by hitting Ctrl+O, then browse to the DVD settings and hit the Advanced Mode button at the bottom left. Under the DVD Setup tab, the playback method should be set to Customized, which is the default. Under Video Decoder select "NVIDIA NVDVD v3+" and under Audio Decoder select "NVIDIA NVDVD v3+." Next, set "Default DirectSound Device" as your Audio Renderer, and "VMR9 Windowless" as your Video Renderer. Now hit the Add button below Additional Filters and select "FFDShow Video Processor." Finally, hit the Register Selected Filters button and close out of the options.

It ain't pretty, but these *Zoom Player Pro* settings will make all your DVDs look their best.

When you launch *ffdshow*'s Video Decoder Configuration utility from the Start menu you'll be confronted with a ton of tweaks and settings. We're going to focus on up-scaling. To turn this on you need to go to the Codecs screen and set Raw Video to "all supported," which makes *ffdshow* handle the output from the *NVDVD* decoder. Next, fire up the on-screen display



Codecs like *ffdshow* can be used to up-convert DVD playback to HDTV resolutions.

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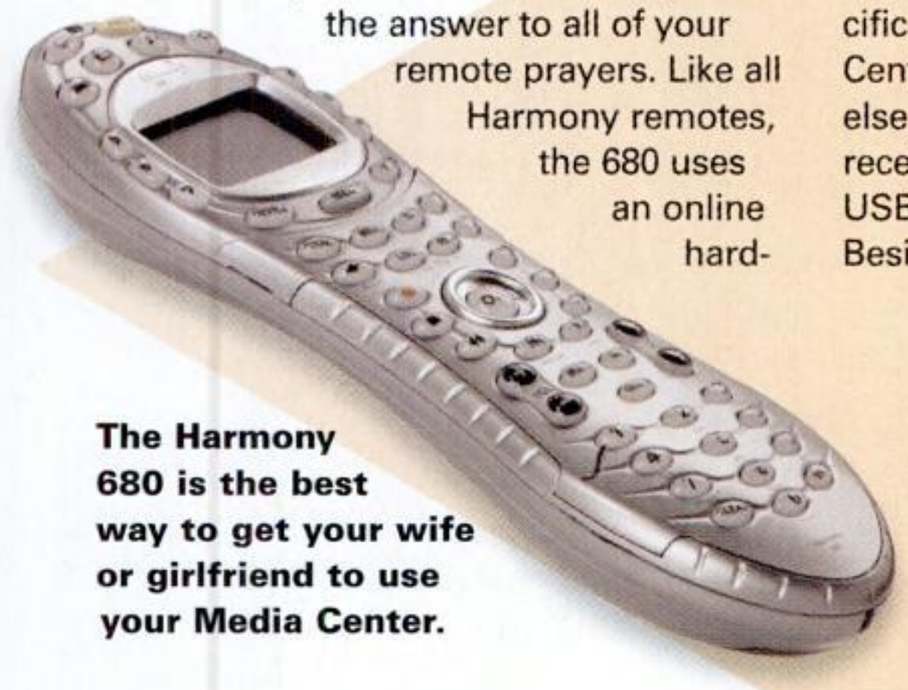
(OSD) so you can see when your *ffdshow* filters are actually working. Finally, turn on the Resize & Aspect filter, select Resize, and enter the high-def resolution you want it to up-convert to, such as 1280x720. Make sure to select "Keep original aspect ratio." Next, enter the settings screen and select the "Lanczos" algorithm for your Resize Method. These steps will deliver the best image quality.

Test it all out by launching *Zoom Player Pro* and hitting Alt+Enter to switch to full-screen. You should notice the improved resolution right away. If you don't, check the upper-left corner of your screen, where four lines of text report the before and after resolutions, how many frames are being processed, and how many CPU cycles are being sucked up in the conversion process. If you do not see any of the above, go back into *ffdshow* and try a different resolution, such as 1440x540 or 1920x1080. It may take a few tries before you find the right combination.

Don't Forget the Remote!

Logitech Harmony 680

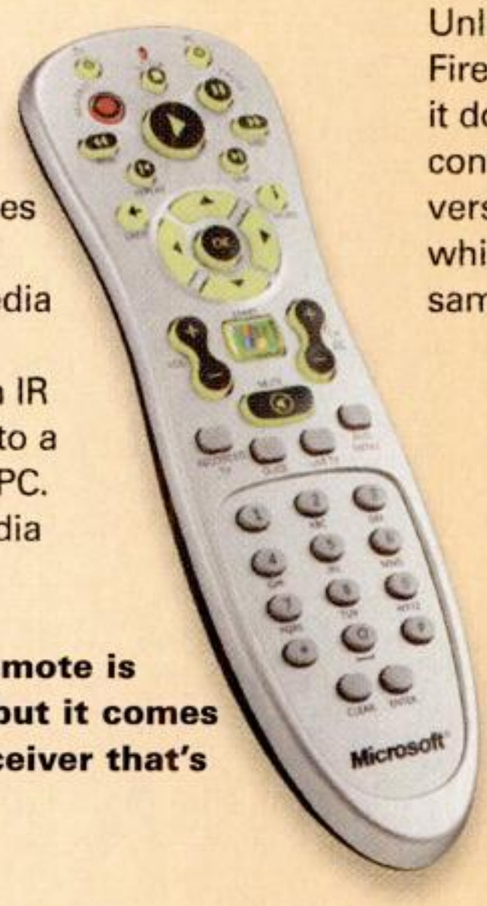
At $170, Logitech's Harmony 680 may be expensive, but it does represent the answer to all of your remote prayers. Like all Harmony remotes, the 680 uses an online hardware database to load new hardware controls. The database contains the control codes for thousands of A/V components that you can load into the remote through your PC's USB plug—so no need for the frustrating "learn program" procedure foisted upon us by most universal remotes. The 680 comes pre-configured for Media Center, and borrows the My TV and My Music motifs to create macros to turn on *and* configure *all* of your A/V hardware for a specific task, such as watching a DVD. To program the remote, you launch a Web Wizard that asks you a series of questions about your components, and then it downloads the appropriate instructions to the 680. You can even use the remote to switch everything off and put your Media Center into standby mode. Theoretically, you can even use it to set up the ultimate bachelor-pad "seduction" macro—dim the lights, start playing some Barry White... you know what we're talking 'bout.



The Harmony 680 is the best way to get your wife or girlfriend to use your Media Center.

Microsoft IR Remote Control

This basic remote is included with most Media Center machines and is designed specifically to control Media Center and nothing else. It comes with an IR receiver that plugs into a USB port on your HTPC. Besides doing all Media Center fundamentals, the best thing that can be said about Microsoft's remote is that it comes with an IR blaster. If you want to use your digital cable or satellite box with Media Center, you're going to need an IR blaster to control the box. These sticky nubs attach to the front of your cable or satellite box in the spot where they receive IR signals from their remote. When it comes time for Media Center to change a channel for a scheduled recording, or while you're watching live TV, the OS will feed the appropriate code to the IR blaster. It gets the bare-bones job done, but upgrading to the 680 is well worth it.



Microsoft's remote is pretty basic, but it comes with an IR receiver that's fairly handy.

Firefly

On a side note, if you have a DirecTV receiver and are willing to forgo Windows Media Center, SnapStream sells a serial cable pack that works through *BeyondTV* to control your satellite box directly. If you're going this route, you might as well go all the way and get a Firefly remote as well. Unlike the Harmony and Microsoft remotes, Firefly uses RF instead of IR, which means it doesn't require a line of sight to send control signals. Firefly comes with a basic version of SnapStream's *BeyondMedia*, which is a media/DVD player that uses the same interface as *BeyondTV*. ■

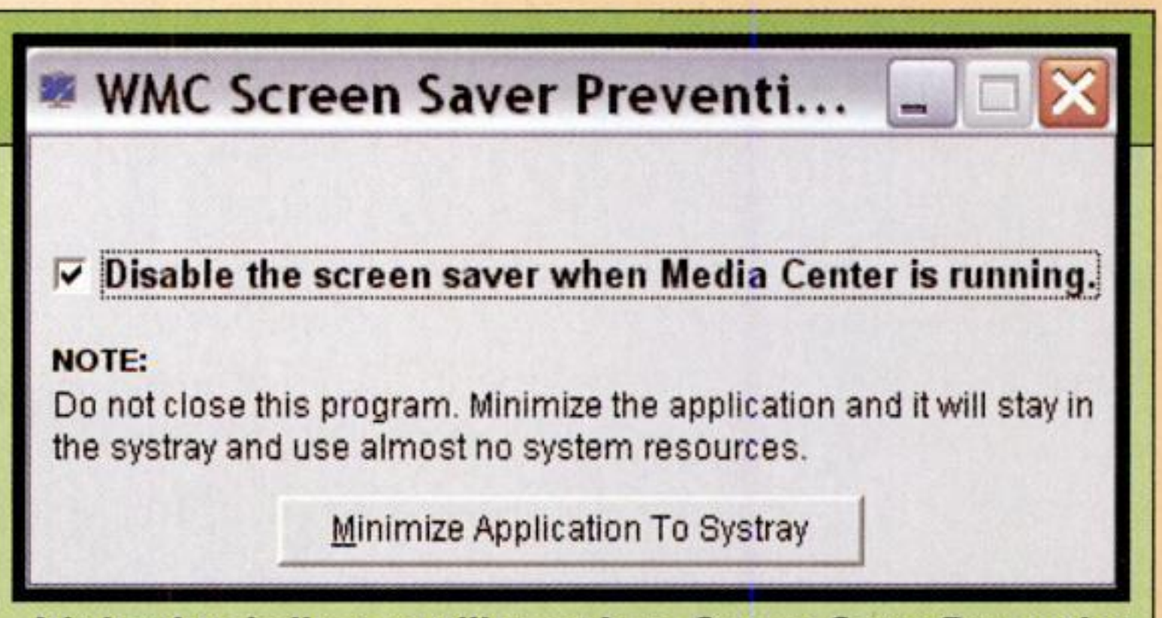
SnapStream's Firefly remote may be the best option for DirecTV fans.

3D Screensavers Are Evil

Three of the Media Center machines sent to us for our roundup, which you'll find on page 36, had 3D Text enabled by default. After leaving any of these machines alone for a bit, we returned to find the "Maximum PC" text replaced with a floating D3D-driver error message. When we tried to exit the screensaver mode the machines locked up, forcing hard reboots.

After some digging around with some systems vendors we discovered that there is a known issue with Media Center Edition 2005 and "certain 3D screensavers." Simply selecting a standard 2D screensaver, such as Aquarium, fixes the problem. So take the safe route and make sure your Media Center machine does not have a 3D screensaver enabled.

Also, WinXP seems to think that when you're using Media Center to watch TV or a movie, your PC is not in use—it'll start up the screensaver at whatever interval you've selected in the display settings panel. Naturally, this is quite inconvenient when you're watching a long movie, and can lead to instability as well. Microsoft may not have a fix for this yet, but the Media Center community does—and it's on the disc that came with this issue. The *Screen Saver Prevention* utility (also available at **www.thegreenbutton.com**) will reside in your system tray and ping the system every 45 seconds. If Media Center is running, it will prevent the screensaver from launching.



It's hard to believe a utility such as *Screen Saver Prevention* needs to exist, but it does.

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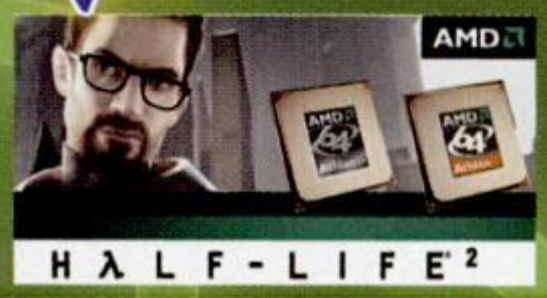

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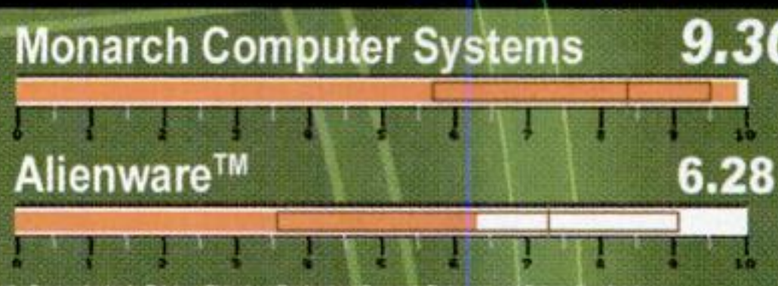

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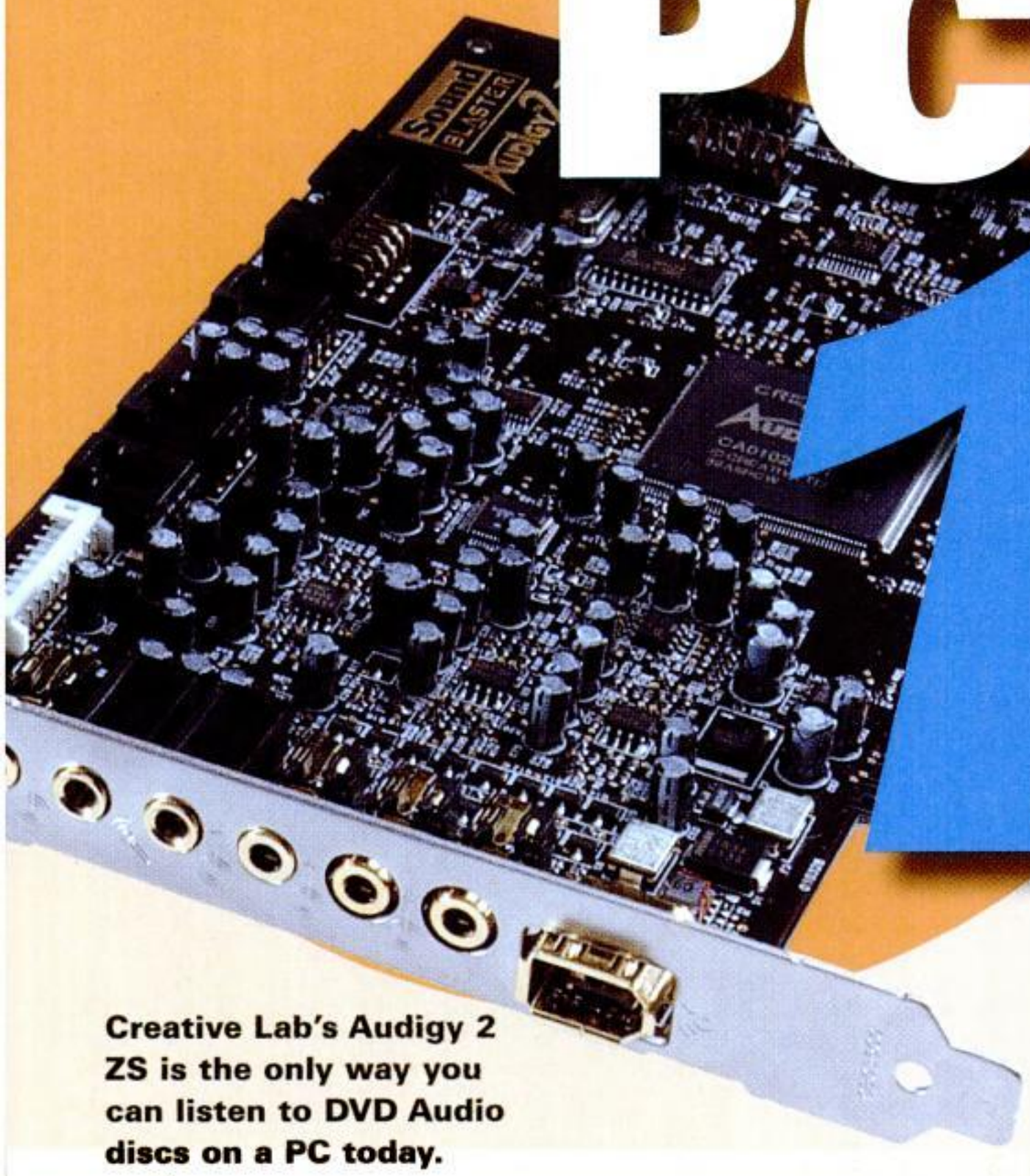
PC Audio 101



Creative Lab's Audigy 2 ZS is the only way you can listen to DVD Audio discs on a PC today.

To get the best sound possible out of your entertainment PC you need to know what's going on under the hood

Incorporating a PC into your home-entertainment system isn't as simple as plugging in the computer and hitting the on switch. In fact, many people grow so frustrated with the whole experience that they wind up shoving the computer back into their office.

The number-one reason for this state of affairs is that most people don't understand how PC audio works. The typical PC is designed to sit on—or beneath—a desk, connected to a set of self-powered, analog, near-field speakers via 1/8-inch plugs (the type you'll find on an iPod or a portable CD player).

The audio foundation of the typical home-theater system, however, is typically an A/V receiver that receives a digital audio stream from a dedicated DVD player and/or a set-top box (a cable or satellite receiver) via a coaxial or optical cable. The speakers themselves are unpowered and analog—the receiver decodes the audio stream (Dolby Digital, DTS, or some variant thereof) in real time, amplifies it, and sends it to the speakers.

So, if you plug your PC's digital-audio output into your A/V receiver's digital-audio input, games, music, and movies should all be good to go, right? Unfortunately, it's not that easy. DVD movies will usually work, because most DVD-player software (e.g., *WinDVD* or *PowerDVD*) is designed to route the encoded audio stream to the PC's S/PDIF jack. When you fire up a game, however, you'll likely run into trouble. Although many games feature surround-sound audio these days, most produce only analog surround-sound streams—audio routed to the S/PDIF jack is mixed down to stereo.

You could try using the digital signal processor (DSP) algorithms in your A/V receiver to create faux surround-sound effects for games, but you probably won't like the results. There's just no equal for 5.1-channel sound that can place audio events—be it footsteps creeping up behind you or bombs exploding in front of you—in a three-dimensional space.

Intel's Audio Studio lets you encode sound from your games and send it through the digital connector in real time using your CPU

If you have a high-end A/V receiver—one equipped with six discrete analog inputs (front right and left, surround right and left, center, and subwoofer), you might try connecting your PC's analog audio outputs into these. You'll need six cables with single 1/8-inch plugs on one end and two RCA plugs on the other (or one cable with three 1/8-inch plugs on one end and six RCA plugs on the other), and you'll need to determine through trial and error which signals are carried on which cables. This will solve the gaming problem, but you might then need to reconfigure your DVD software so that your PC or soundcard handles the decoding chores and routes the audio to its analog jacks.

A second, more efficient solution is to have your PC encode the analog audio streams to Dolby Digital in real time, but there are only two ways to do that—and one of these is outdated. If you have a

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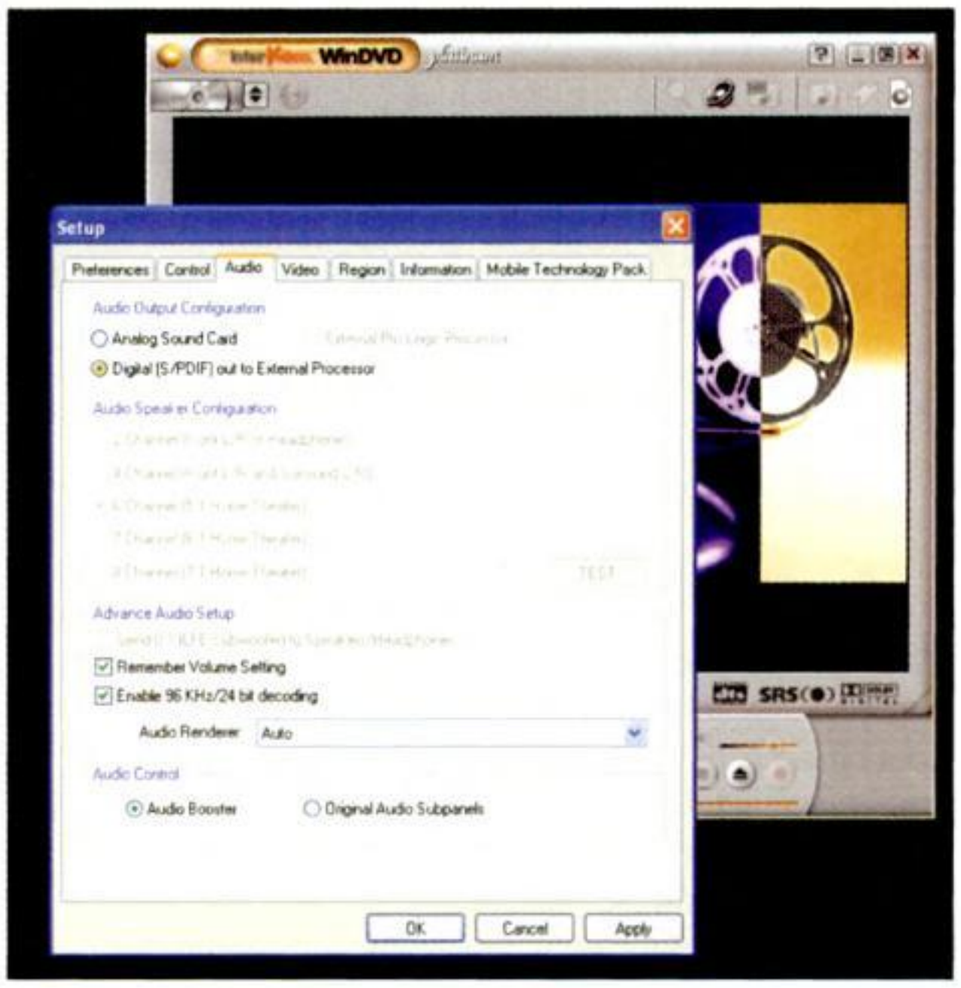
motherboard that uses nVidia's nForce2 chipset for AMD's Athlon XP, you have an onboard chip dedicated to the task. This chip was originally designed for the Xbox, which dynamically encodes 5.1-positional audio in games and streams DVD-movie audio in digital form, but nVidia didn't include this feature in its nForce3 and nForce4 chipsets.

A more up-to-date solution can be found on motherboards based on Intel's 915, 925X/XE, 945, and 955X chipsets, which feature Intel's HD Audio with Dolby Digital Live. As with nVidia's solution, audio streams are encoded to Dolby Digital in real time, but Intel's solution relies on the host PC's CPU, instead of a dedicated chip. Hardware purists have traditionally frowned on such host-based processing because it steals precious CPU cycles, but this perception stems from the day when a 500MHz Pentium III would have been severely hobbled by the task. With today's dual-core processors and multi-gigahertz CPUs, even the most diehard PC nut would have a hard time winning an argument against host-based audio. But there's still a cost to be reckoned with: We've performance hits ranging from 3 to 10 percent.

If you don't own an A/V receiver and a 5.1-channel speaker system, you might consider using a 5.1-channel powered speaker system that's specifically designed for a PC. This will solve all your surround-sound problems, but since these systems are usually designed for near-field listening, they can't fill large rooms with sound. Turn to page 30 for a head-to-head comparison of these two audio solutions.

DVD Audio

DVD Audio is still an emerging technology—you'll have the best luck shopping for the discs online—but it delivers fidelity several notches above that of CD Audio (and it obliterates MP3 audio). Whereas CDs support only stereo output with 16-bit resolution and a 44.1kHz sampling rate, DVD Audio discs boast 24-bit resolution with a 192kHz sampling rate in stereo, and 96kHz sampling rates in 5.1-channel surround sound. Comparing DVD Audio to CD audio is the audio equivalent of gazing at a high-definition television next to a 1965 black-and-white portable with rabbit ears—you won't want to go back to CDs again. Don't confuse DVD Audio with the audio on DVD movie discs—DVD Audio is far superior.



You'll need to configure WinDVD to output audio to the S/PDIF to get it to work with most home surround-sound decks using the digital jacks.

There's only one way to play DVD Audio on the PC today: You need Creative Labs' Sound Blaster Audigy 2 ZS soundcard. Intel's HD Audio is technically capable of playing DVD Audio, and several software DVD players support DVD Audio, but the Audigy ZS is the only card right now that has built-in DVD Audio copy protection. And that makes it the only game in town, at least for now.

DVD Audio playback can be performed only through the aforementioned six discrete analog outputs—this is true even of those stand-alone DVD players that support the format. The reasoning behind this limitation is obvious: to prevent you from making perfect digital copies of DVD Audio content.

Once you understand these key concepts, configuring audio on your home-entertainment PC should be far easier. For more specific instructions on how to physically connect your home-entertainment PC to your living-room sound system, turn to our story on page 23.

PC Audio Terminology

AC97: Intel's Audio Codec '97 spec ratified a set of standards for onboard PC audio, such as separating the analog circuits from digital circuits. AC97 is limited to 16- to 20-bit audio codecs, which leave it far behind today's competition.

AC-3: see Dolby Digital.

HD AUDIO: Intel's newest audio spec supports much higher-quality audio (up to 32-bit resolution and a 192kHz sampling rate) and up to eight channels. Like AC97 though, it's host-based, which means a majority of the audio processing is done by the CPU. Having said that, HD Audio in combination with Dolby Digital Live might make the most sense for a home-entertainment system.

DOLBY DIGITAL: The standard that the majority of home movies are encoded in, Dolby Digital 5.1 supports up to four discrete satellites, a center channel, and a subwoofer. Dolby Digital 5.1 is also used for most cable and satellite systems and is the most common surround-sound format used for home entertainment. An EX variant of Dolby Digital adds additional satellite speakers.

DTS: A competing surround-sound standard to Dolby Digital 5.1, DTS uses lower compression rates than Dolby Digital but like MP3 vs. WMA, both camps can argue which is better until the end of the world. Dolby's leg up is that it's used by an overwhelming majority of DVD movies.

DOLBY DIGITAL LIVE: A software method of encoding or converting stereo or surround-sound sources on a PC so that an external Dolby Digital receiver can decode it.

HRTF: Head-related transfer function. A method that audio engineers use to develop algorithms for virtual surround-sound via stereo speakers or headphones.

S/PDIF: Sony/Philips Digital Interface. Developed by Sony and Philips as a means to transfer audio data in the digital realm. The S/PDIF jacks on most motherboards and sound cards are designed for use with either coaxial or optical cables.

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Head2Head

Home Theater Sound

There was a time when buying speakers for your PC was easy: You'd pick up the best-quality self-powered speakers you could afford, increasing amplifier size and system complexity (2.1, 5.1, or even 7.1 channels) as your budget allowed. But does that logic apply when it comes to buying speakers for a media center PC? To find out, we compared two systems from Cambridge SoundWorks: the MegaWorks 505 Amplified Multimedia Speaker System and the Newton Theater MC200.2 Home Theater System. Since the Newton system, like most home-theater speaker systems, is not self-powered, we paired it with an Onkyo TX-SR602 A/V receiver. Here's what we discovered. —**MICHAEL BROWN**

MegaWorks 505 Amplified Multimedia Speaker System

AMPLIFIER: The MegaWorks 505 uses a 500-watt BASH amplifier housed in its subwoofer to send 150 watts to the sub, and 70 watts to each of the five satellite speakers. The MegaWorks' amp accepts only analog signals and relies on the source device for surround-sound decoding (e.g., Dolby Digital or DTS). And that's fine since you can add a multi-channel soundcard to most any PC that doesn't already have it. The wired remote volume control is tethered to the subwoofer, which isn't the most convenient solution for a living-room environment. But when it comes to powering a home theater, this solution is weak in that it's limited to providing audio for your PC and one other stereo source—you can't plug in surround sound from a videogame console or stand-alone DVD player; at least, not at the same time. **Winner: Newton Theater MC200.2 and Onkyo TX-SR602**

SATELLITES: The five satellite speakers are identical cubes housing single 3.5-inch drivers that provide both mid-range and treble. Cambridge SoundWorks packages these speakers with their low-end home-theater speaker systems. They're very good speakers, for the money, and they deliver clean, crisp sound with both music and movie soundtracks. But the small drivers in these cabinets don't have a lot of throw-weight, and there's no way to customize the surround-sound field to your listening environment. **Winner: Newton Theater MC200.2 and Onkyo TX-R602**

PERFORMANCE: The MegaWorks 505 doesn't have a surround-sound decoder, so it relies on your PC for this task. But unless you're using your PC for *all* your audio-video needs—not likely—you'll need to disconnect your PC to switch to another source. One alternative is to plug your PC's analog audio outputs into an A/V receiver's analog surround-sound inputs, but you'd need a more expensive receiver—one that provides surround-sound pre outs (i.e, the audio signals bypass the receiver's amplifier and emerge as line-level outputs). But moving up to a more expensive receiver will eat up most of the money you saved buying the MegaWorks 505. **Winner: Newton Theater MC200.2 and Onkyo TX-SR602**

VALUE: When it comes to providing audio for a full-featured home-entertainment system, the combination of dedicated home-theater speakers and a good A/V receiver are obviously your best choice. Equally obvious, however, is the difference in price tags: The MegaWorks 505 rings the cash register to the tune of $400; the Newton Theater MC200.2 and the Onkyo TX-SR602 will set you back $1,300. That $900 difference will buy a lot of movies, music, and games. **Winner: MegaWorks 505 Amplified Multimedia Speaker System**

SUBWOOFER: The BassCube 851 subwoofer in this system features an eight-inch long-throw driver and frequency response all the way down to 32Hz. Receiving 150 watts from the integrated BASH amp, the sub will rattle your windows when it's cranked up. More importantly, it's capable of filling good-sized room with thundering bass—a very important consideration for movies and games. Unless you have an extremely large room, it's tough to beat this sub's price/performance ratio. **Winner: MegaWorks 505 Amplified Multimedia Speaker System**

MAXIMUM PC VERDICT **8**

+ SCHNITZEL

A great home-theater system for anyone with a tight budget.

− WIENERSCHNITZEL

Satellites lack throw-weight; limited to one surround-sound source.

$400, www.cambridgesoundworks.com

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Newton Theater MC2002.2 and Onkyo TX-SR602

AMPLIFIER: In a classic case of you-get-what-you-pay-for, choosing an A/V receiver over a self-powered speaker system delivers more of everything. In the case of the Onkyo TX-SR602, that means more power with less distortion, an AM/FM tuner, support for a second zone (so you can listen to the same or different stereo audio source in two different rooms), video-follow-audio switching, multiple audio and video inputs and outputs... the list goes on. Even when you consider that this A/V receiver alone costs $100 more than the entire MegaWorks 505 speaker system, its price/performance ratio is tough to beat. Six—count 'em, six—discrete amps deliver 85 watts per channel into six channels, a five-position crossover adjustment makes it a breeze to blend a variety of satellite/subwoofer speaker combos, and a wireless learning remote are just the tip of the feature iceberg. **Winner: Newton Theater MC200.2 and Onkyo TX-SR602**

PERFORMANCE: Pairing an A/V receiver with a computer results in inevitable duplication of features. Most new PCs have surround-sound decoders and high-resolution DACs, for instance, either on the motherboard or on a soundcard. But there's no better solution than an A/V receiver for switching between various audio/visual devices. The speakers in this system are specifically designed for the demanding requirements of home theater—they delivered out-of-this-world performance with music, movies, and games.
Winner: Newton Theater MC200.2 and Onkyo TX-SR602

SUBWOOFER: When it comes to reproducing extremely low frequencies, you need a big amp coupled with a big driver that's capable of displacing a lot of air. The Newton Series P200 subwoofer delivers on this score, pairing a powerful 200-watt BASH amplifier with a large 10-inch polymer-laminate woofer capable of frequency response down to 25Hz. Purchased by itself, this monster sub would set you back a cool $600. In our moderately sized living room, however, the much cheaper sub packaged with the MegaWorks 505 was more than adequate. **Winner: MegaWorks 505 Amplified Multimedia Speaker System**

SATELLITES: When it comes to reproducing fine audio nuances, it's hard to beat a two-way speaker system. And you'll always be better-served by speakers dedicated to specific purposes. Where the MegaWorks 505 relies on five identical single-driver satellites for front left and right, center, and surround sound, the MC200.2 has specialized speakers: A pair of MC200s featuring four-inch woofers and one-inch silk-fabric tweeters, coupled with an MC300 center channel (the same tweeter and two of the same woofers as the MC200), handle things up front. A pair of S200 surround speakers take care of surround sound. These speakers can be switched between bipolar and dipolar dispersion patterns for different seating configurations. **Winner: Newton Theater MC200.2 and Onkyo TX-SR602**

VALUE: Home-theater enthusiasts and audiophiles will never tire of pointing out the superior features and specs that specialized speakers and A/V receivers offer. And there's no question which system sounds better. You'll also get much more flexibility from the Newton/Onkyo combo than you will from even the most expensive multimedia speaker system. But when your budget is tight, the MegaWorks 505's most significant compromise is its limited number of inputs. **Winner: MegaWorks 505 Amplified Multimedia Speaker System**

MAXIMUM PC VERDICT **9**

+ LINGUICA
Great speakers paired with an even better value-priced A/V receiver.

– BLACK PUDDING
Value-priced or not, $1,300 is still a lot of money.

$1,300, www.cambridgesoundworks.com

The Upshot

Multimedia speaker systems like the MegaWorks 505 can provide whole-room audio, but these packages are nearly always designed for near-field listening—not to fill a living room with sound. The MegaWorks 505 system is a better candidate than most, because it features home-theater components—albeit low-end choices—and it's priced right. But when it comes to movies and games on the big screen, there's just no substitute for a dedicated A/V receiver and a great set of speakers. It's tough to beat the combination of Onkyo's TX-SR602 and Cambridge SoundWorks' Newton Theater MC200.2.

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Head2Head
Surround-Sound Headphones

When we heard about headphones capable of replicating the surround-sound effect of 5.1- or 6.1-channel speaker systems, we donned our hip boots and prepared to wade into some deep BS. But after listening to a couple sets—wireless, no less—from Pioneer and Sony, we put our boots back into the closet. Neither product is cheap; in fact, both of these sets cost more than a high-end 5.1 PC speaker rig. Can either of these puppies live up to their hype—and their price tags? Let's find out.

Pioneer SE-DIR800C

SOUND PROCESSOR: Both models consist of a wired transceiver that receives an input signal from a source and beams the audio (via infrared) to one or more pairs of wireless, battery-powered headphones. Pioneer's transceiver features two digital inputs (one optical, one coaxial) and one analog input (stereo RCA). A front-panel switch selects the active input. The receiver is outfitted with decoders for Dolby Digital, Dolby Pro Logic II, and DTS. It re-encodes these signals into two channels, which replicate the acoustic effect of five speakers plus a subwoofer. There are also three listening options that replicate the acoustic effects of a recording studio, a living room, or a movie theater/concert hall. These are all solid specs, but Sony's transceiver offers this and more. **Winner: Sony MDR-DS8000**

HEADPHONES: The soft, generously padded earmuffs are a closed design that's very effective at eliminating background noise, such as the hum of a nearby PC. The infrared receiver provides clear, crisp signals devoid of interference at the maximum stated range of 26 feet, as long as you stay in line of sight of the receiver. Beyond that distance, we experienced drop-outs and interference. Although the phones are a bit bulky, the double-banded, self-adjusting headband remains comfortable after several hours of continuous use. We really like the easy-to-reach volume control on the right-hand headphone case. The phones are powered by two rechargeable AA batteries (included, with the charger housed inside the transceiver) that provided several days of heavy use on a single charge; unfortunately, the set does not have an auto on/off function. **Winner: Sony MDR-DS8000**

MAXIMUM PC VERDICT **8**

+ 5.1

Accurate, natural surround effects; comfortable design; integrated battery charger; a good price.

− 0.0

Only one optical-in, and no auto on/off. Slow battery recharge.

$400, www.pioneerelectronics.com

PERFORMANCE: The 800Cs churned out very believable surround-sound effects with movies, music, and games in both living-room and home-office use. Directional audio cues, such as the ricocheting bullets in Saving Private Ryan, sounded truly "out of head." Having said that, surround effects do sound "closer" than they would with an actual 5.1-channel system (this is also true of Sony's set). Still, the Pioneer 800C provided the best 5.1 effect we'd ever heard in a set of headphones; that is, until we tried Sony's product. **Winner: Sony MDR-DS8000**

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Sony MDR-DS8000

SOUND PROCESSOR: The MDR-DS8000 transceiver not only does more than the 800C does—it looks and sounds better while doing it. It features two digital optical inputs, plus a set of analog RCA inputs. This stylish kit will decode just about any digital audio signal you can think of: DTS, DTS ES, Dolby Digital, Dolby Digital EX, Dolby Surround, Dolby Pro Logic II, and MPEG-2 AAC. It can also replicate not just 5.1-channel surround sound, but 6.1-channel sound, too. **Winner: Sony MDR-DS8000**

PERFORMANCE: The MDR-DS8000s delivered crisper, more pronounced surround-sound effects across all categories: music, movies, and games. They were also slightly better than the 800Cs when it came to delivering conventional stereo audio. **Winner: Sony MDR-DS8000**

HEADPHONES: The DS8000 headphones have a round, open-air design that provides a cooler fit and slightly richer sound, but this does render them more susceptible to interference from background noise. The headset controls are on the interior of the right speaker pod, so the volume dial can be tricky to use without taking the headphones off. A pod above the left headphone houses Sony's Gyrotrak head-tracking system, which enables you to move your head without changing the directional effect of the audio. With Gyrotrak, you can dance around to a concert DVD without destroying the illusion of being front and center. (Not that we did this, of course—at least there aren't any pictures.) Despite the open design, Sony's headphones are bulkier than Pioneer's, and they weren't quite as comfortable for long stretches. But three features trump these drawbacks: Gyrotrak, an auto on/off feature, and a longer infrared range (33 feet). **Winner: Sony MDR-DS8000**

MAXIMUM PC VERDICT **9**

+ EPISODE IV

Rich music playback, more pronounced surround effects, and features aplenty.

– EPISODE I

Somewhat bulky design, tough-to-reach volume dial, and a bit tough to configure.

$800, www.sonystyle.com

The Upshot

Pioneer failed to win a single category, but that doesn't mean the 800Cs aren't excellent—especially if you're on a budget. The Sony's are just a step ahead. There's bad news for PC gamers hoping to quiet their lives with these headphones, however. Neither set sports 5.1 analog inputs, therefore most soundcards are incapable of delivering a true 5.1 signal to the 'phones. That means no positional sound in most games. The good news is that with the proper signal, both sets deliver on the promise of natural-sounding surround effects. These headphones can't match the floor-quaking effect of a booming multichannel surround-sound system, but they're the next best thing.

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Game Experience May Change During Online Play

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Ready for Prime Time?

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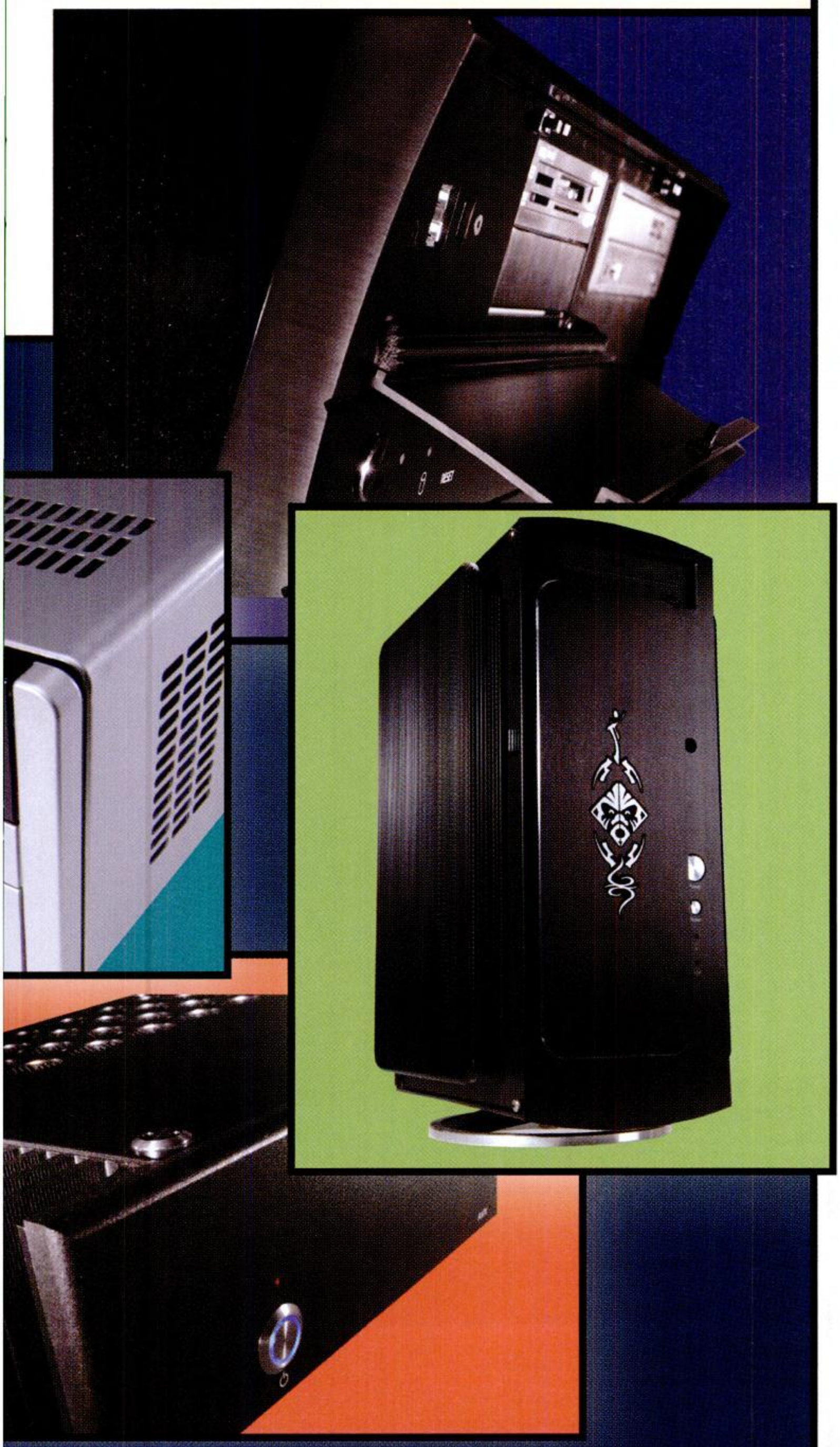
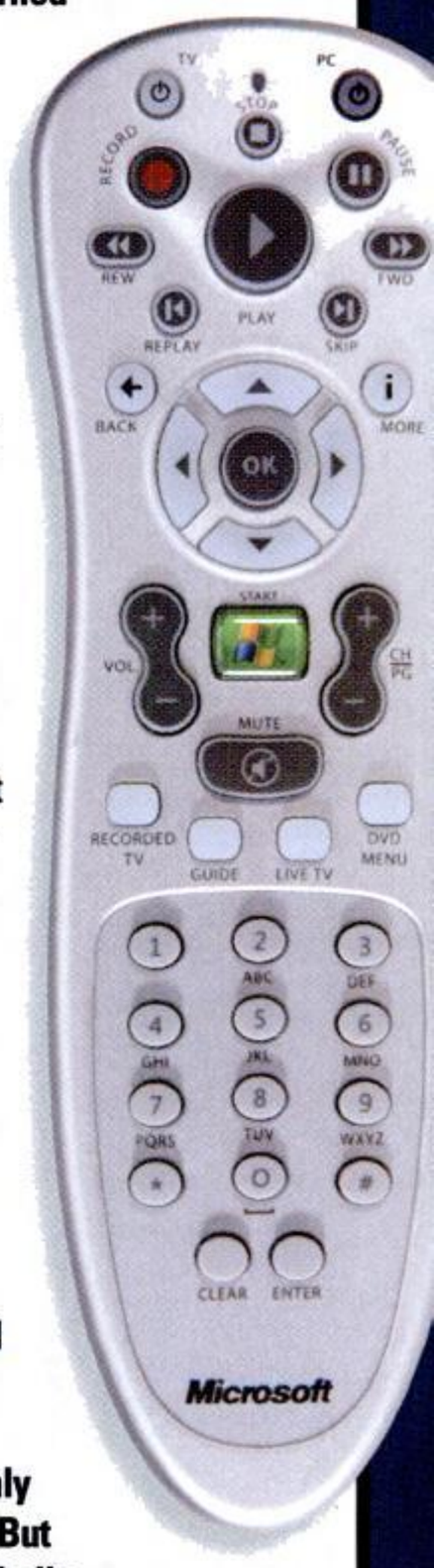
Media Center PC form factors are finally evolving into something we'd actually put in our living room. But does their performance match their new good looks? To find out, we review seven of the latest machines.



As far as concepts go, the Media Center PC sounds pretty appealing. Theoretically, it merges your bulky receiver, DVD player, and TiVo into a single network-able unit that can manage your entire library of music, photos, TV programs, and movies. Who wouldn't want that?

But—and if you're an early adopter, you already know this—the gap between concept and reality can be wide, deep, and frustrating. Initial hardware and software efforts were awkward, ungainly attempts to make the PC an integral part of your living-room entertainment center. However, as you've already learned in our feature on the OS (see page 6), Media Center 2005 is a significant upgrade, and it edges the platform closer to Bill's promise of delivering a do-it-all entertainment PC. Unfortunately, it still has some quirks—such as an annoying D3D driver conflict that caused screensaver-related crash issues with many of our test systems. D'oh!



So while it's safe to start wading into Media Center's waters, we don't recommend that you throw out that TiVo just yet. Relying on a Media Center PC to record Game Seven of the World Series when we're away from home is something we're still not comfortable with. They're just not reliable enough.

Over the years, TiVo has achieved high marks for its personal video recording (known as PVR) and networked media-management abilities. With a simple-to-use, highly evolved interface, it has certainly won over its share of converts. But third-generation off-the-shelf Media Center systems are coming out, and they're much more stable, powerful, and feature-rich than systems we looked at just last winter. In the following pages, we examine how some of the latest Media Center PCs from several well-known manufacturers, fare against the incumbant–TiVo. ►

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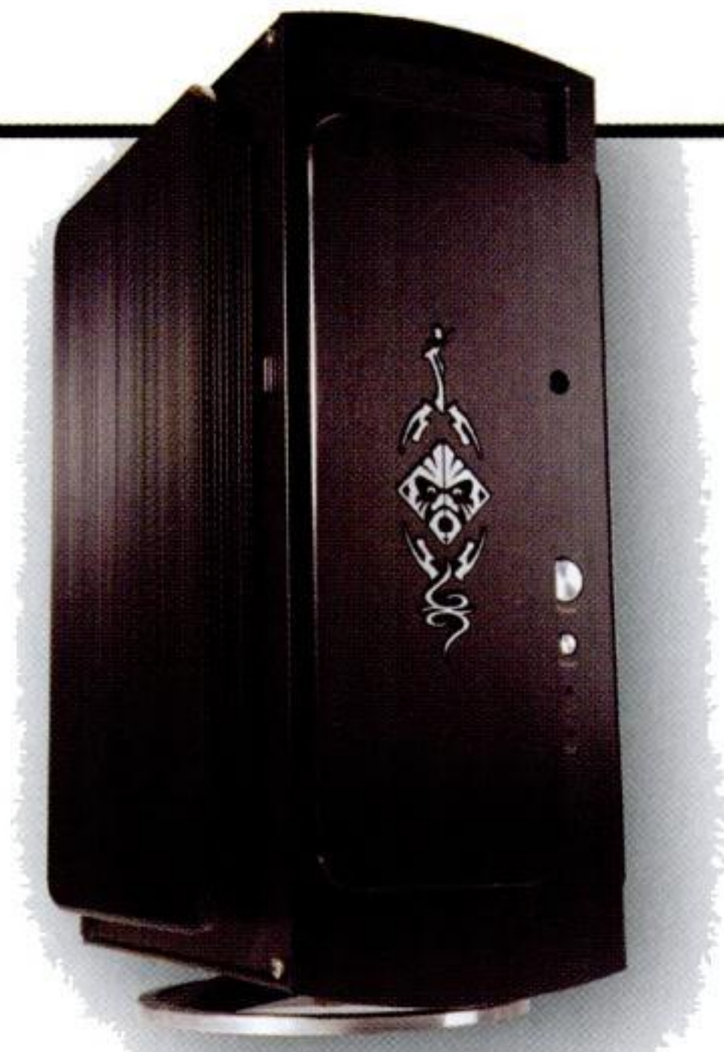
Voodoo EPIC

With just about everyone else churning out new Media Center PCs with A/V component-style form factors, Voodoo PC's EPIC—hot off the assembly line—stands alone in this roundup with its traditional PC tower configuration. Initially, we thought the design represented a bit of backwards-thinking. In practice, it proved to be one of the most practical, and powerful, Media Center PCs we've tested.

Sure, you can't place the EPIC on a rack, but you can't do that with many console form-factor machines, either. The EPIC can conceivably be placed inside a roomy cabinet, and it will reside quite comfortably in a corner or on the floor next to your entertainment console. Big, bulky, and brutish, the EPIC nevertheless looks stylish clad in its all-black, brushed-aluminum, custom-designed Zalman case. A rotating pedestal on the bottom lets you spin the EPIC to connect components without having to physically move it—it's a heavy machine at 40lbs, thanks mostly to its unique case.



The EPIC is the only tower Media Center in this roundup, and it's also the most powerful—and the most expensive.

This case resembles a futuristic radiator in look and design, which is apropos because it is essentially just that. The entire case acts as a giant heatsink that enables the EPIC to operate entirely without fans—while housing enough horsepower to run any 3D game in style, and without burning a hole in your floor.

Every heat-producing component inside the case sits on an aluminum heatsink with copper pipes that connect to the outside of the chassis on either side, where there are large passive heatsinks designed to dissipate heat. The case is the next evolution of the Zalman case Voodoo uses for its fanless Envy machines, and it works beautifully. The EPIC is the quietest, coolest, and most powerful Media Center PC we've tested yet.

Our test machine came with a 2.2GHz Pentium M, 1GB of PC3200 RAM, a 400GB 7,200-RPM SATA drive, and an nVidia GeForce 6800 GT. We tossed every game we could at this bad boy, and it handled them all without breaking a sweat—or causing us to. The EPIC can actually handle playing a game with Media Center running in the background, albeit with a noticeable performance hit.

Our prototype machine had only a single NTSC tuner—the production version will include two. (The EPIC can handle up to four.) Aside from an initial D3D driver conflict with the default 3D Text screensaver, which caused our machine to crash a few times, the EPIC handled PVR duties flawlessly for two weeks—never dropping a scheduled program. (Every machine we tested had the same D3D issue with any 3D screensaver, and vendors are aware of this issue—so it's a bit strange that both Voodoo and Alienware shipped their review systems with 3D Text enabled by default. The crashes stopped once we changed the screensaver to a 2D option.)

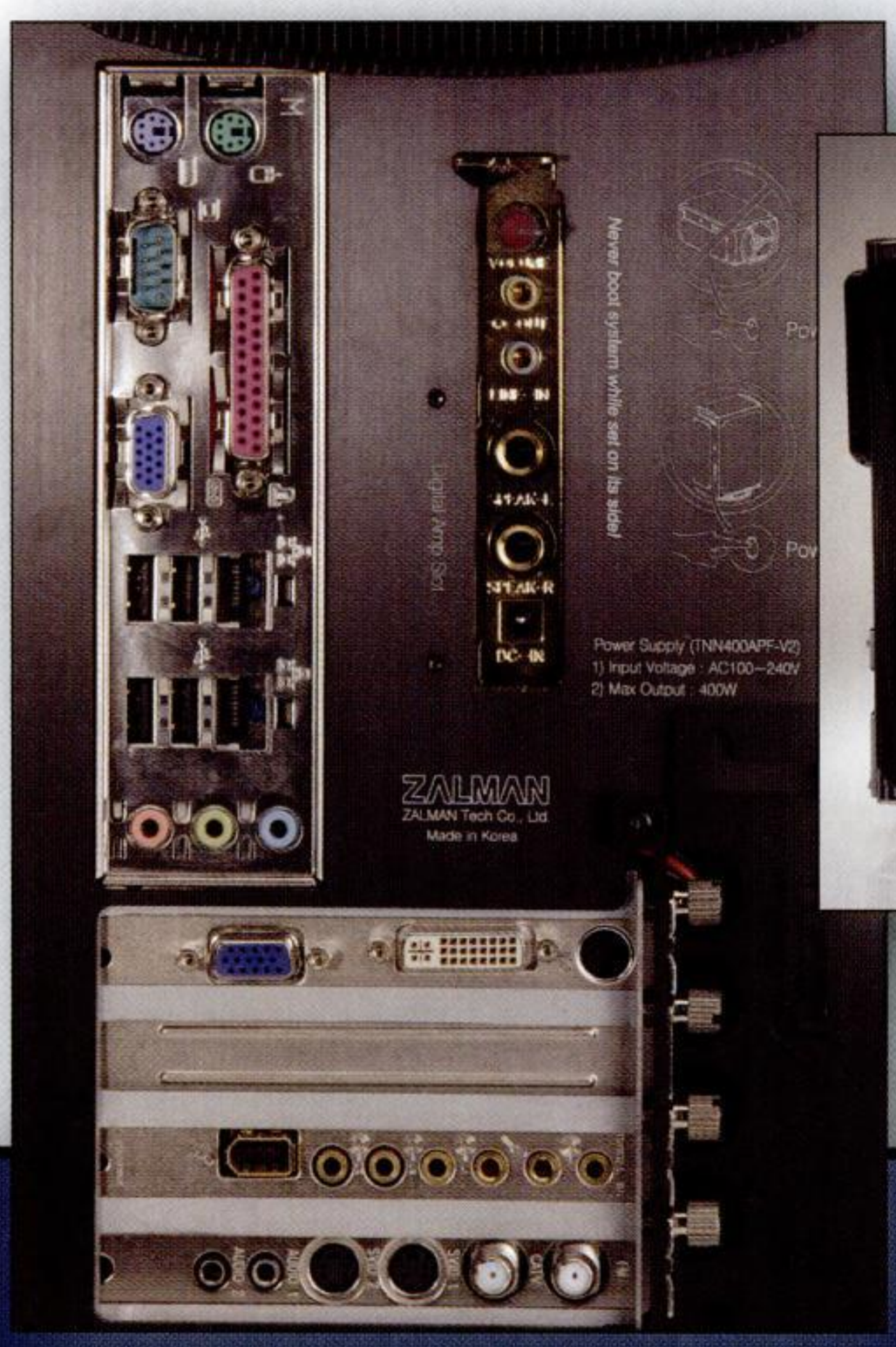
The EPIC is also the first Media Center we've had in the lab that has an integrated, self-powered amplifier that lets you connect directly to a set of 5.1 home-theater speakers—eliminating the need for an external A/V receiver, which is a nice touch.

Conspicuously absent, however, is integrated Wi-Fi, which is pretty much a standard with newer Media Center machines—Voodoo doesn't think Wi-Fi performance is up to snuff for Media Center duties, compared to a hard-wired net connection, so they don't include one.

Still, if you want an entertainment PC that's got game, and you've got the scratch, the EPIC's a solid choice.

VERDICT 8 **$3,495**

www.voodoopc.com



The EPIC's tower includes a built-in powered 5.1 amplifier made by Zalman.

While expensive, the custom Zalman case is extremely effective at dissipating heat.

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HP z545 Digital Entertainment Center

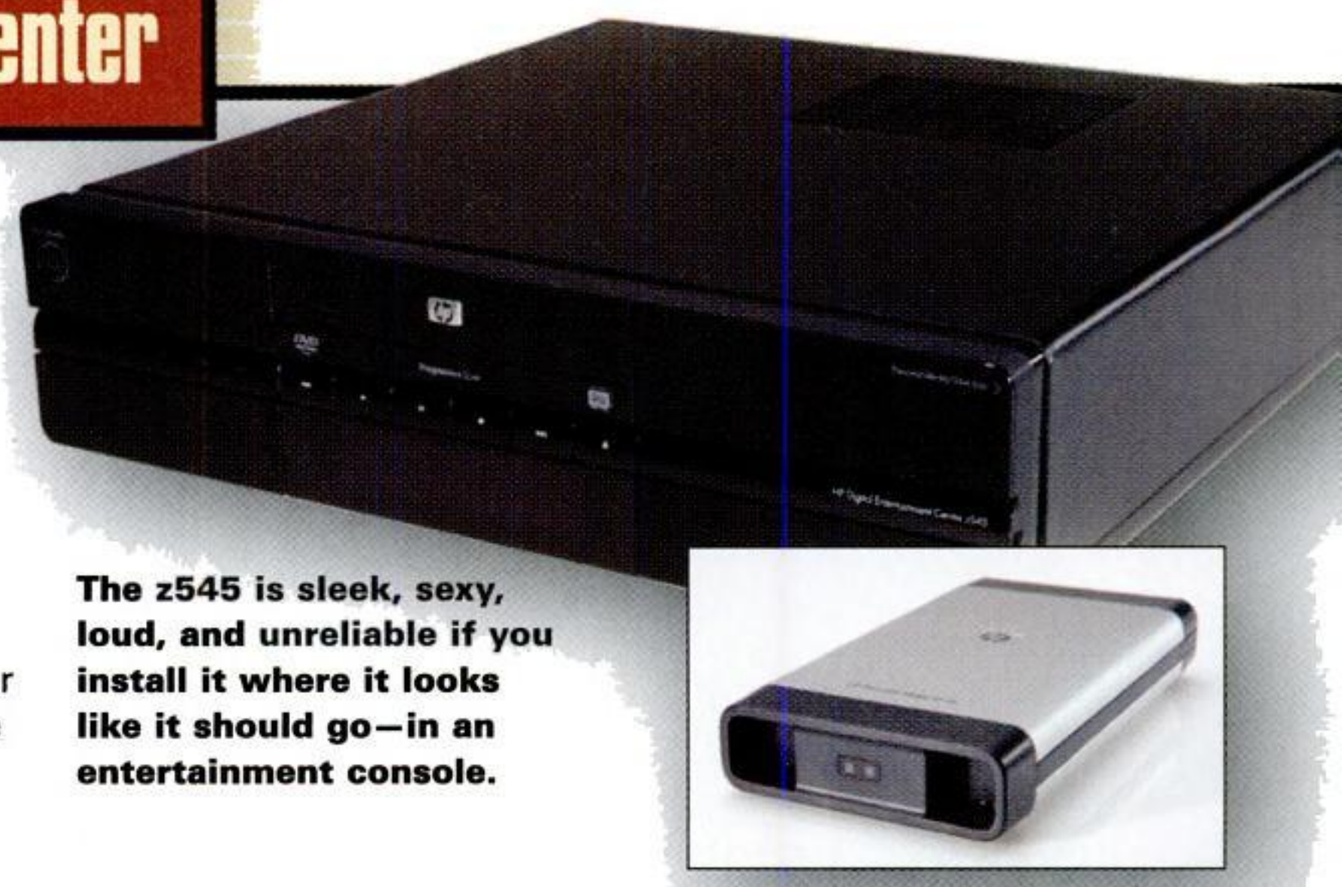
The irony about PC-makers starting to design Media Center PCs to match home-theater components' form—and function—is many of these PCs can not be placed in a typical enclosed entertainment console. They simply put out too much heat and they won't perform reliably.

Case in point: HP's slick-looking z545 Digital Entertainment Center PC, which looks like it should be right at home in an entertainment console with your A/V equipment. However, when we put our test system on a shelf below our TV, in a console that is open in the front and back, it kicked up all sorts of protests. After just a few hours of being on, its internal fan kicked in at leaf-blower levels (the case was extremely hot to the touch) and the DVD drive began to behave erratically—movies paused, skipped, and completely froze.

HP *does* instruct you to place the z545 in a well-ventilated area—and once we moved the machine out of our cubby, it performed admirably: zero leaf-blowing or DVD playback issues. However, to design the z545 like a standard piece of home-theater equipment and then tell you not to put it where you have the rest of your A/V components is a bit silly. It's like giving Jeff Gordon the keys to a Corvette and telling him not to go above 30 mph!

The z545 performs standard DVD, DVR, and CD-player duties. It will also play nice with your audio setup, with hookups for Dolby Digital 5.1 and analog 7.1 pre-amp surround sound. And its dual NTSC tuners will let you record and watch TV programs on up to two channels simultaneously—two set-top boxes required. (An update to the platform, the z555, will include an integrated over-the-air HDTV tuner and LightScribe technology for laser-etching DVD/CD labels. It's due this summer.) The z545's large, bright LED display is easy to read from the couch and shows programming, DVD chapter, CD music track, and other data.

The machine boasts solid specs for a general, all-purpose PC: 3GHz P4, 512MB PC3200 DDR SDRAM, ATI x300 with 128MB RAM, 200GB 7,200 SATA drive. However, don't expect to use it for games. The x300 PCI-Express card simply chokes on the latest 3D titles, such as *Doom 3*. (If you need your Media Center PC to have gaming muscle, check out Voodoo's offering on page 38.)



The z545 is sleek, sexy, loud, and unreliable if you install it where it looks like it should go—in an entertainment console.

The 160 portable media drive slides in and out of the front of the z545.

The z545 does pack in a lot of extras that make up for its lack of gaming prowess, such as a removable 160GB drive, built in Wi-Fi (802.11 b/g), and an integrated 9-in-1 media card reader. The 16X double-layer DVD+R/RW drive provides progressive scan DVD movie playback at 480p resolution. While the z545 performed flawlessly with DVD media, it had some read issues with CDs—refusing to recognize our *Halo* CD, for instance.

Finally, we experienced some DVI connection instability. Initially, the z545 fired up and worked flawlessly with our test big-screens, including HP's own plasma display (see review, page 57). However, on one occasion after a boot it did fail to recognize the DVI input as active, and it was necessary to reconfigure the display settings to get it to work again.

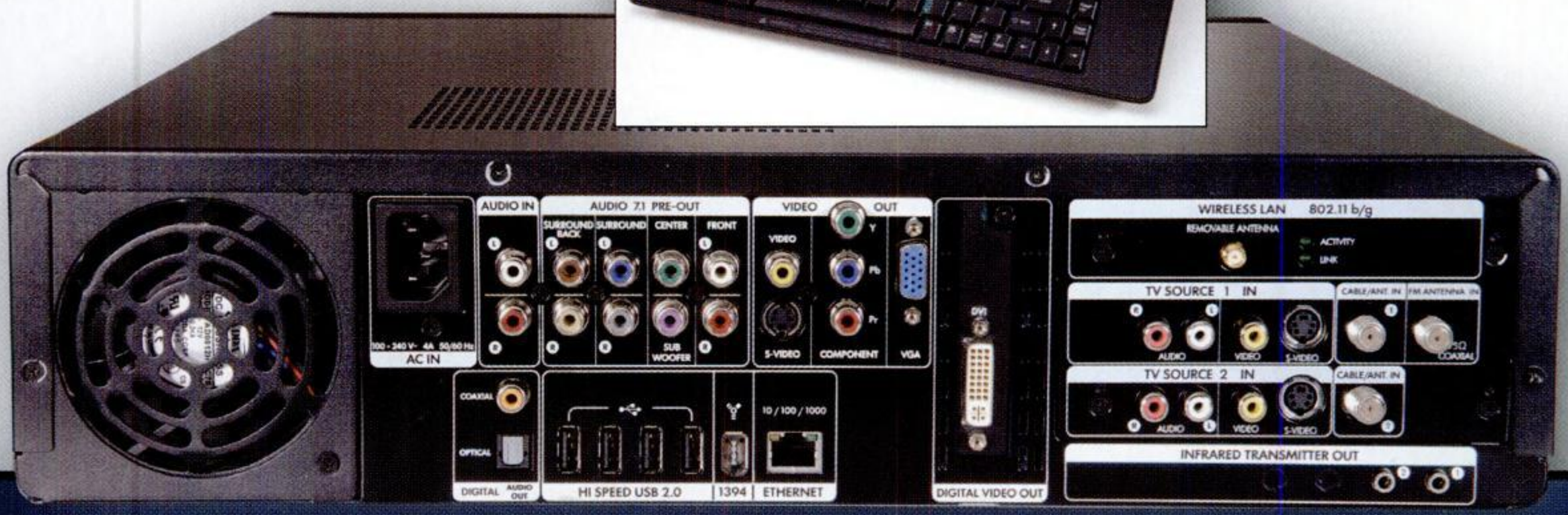
If HP can iron out these quirks with the z555, they'll likely have a winner—until then, there are more reliable choices out there.

VERDICT 6 **$1,799.99**

www.hp.com

The included keyboard is compact but very usable—an on-board trackball makes couch-surfing a breeze.

The z545 has connections on the back for just about anything you could want—except HDTV, that is.



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Alienware DHS 2

The DHS 2 is slightly smaller, quieter, and cooler than HP's z545, and it's pretty, too.

Now, this is a little bit more like it—a Media Center PC in a "living-room" form factor that you can actually put in an entertainment console without fear of everything spontaneously bursting into flames after you use it for a few hours.

While every bit as functional as HP's z545, the DHS 2 is significantly cooler after extended operation, is slightly quieter, and it packs more punch. The DHS 2 is home to a 3.4GHz P4, 1GB of PC-3200 DDR SDRAM, an ATI x300 with 128MB of RAM, and a 250GB 7,200-RPM SATA drive.

Our test DHS 2 ran for two weeks straight in an enclosed armoire without a hitch, never dropping a scheduled program recording or kicking up a fuss with DVD or TV video playback. The case did get a bit uncomfortably warm to the touch, but there were no associated performance issues.

Unfortunately, after we first set up the DHS 2, it did crash a few times when exiting screen-saver mode—3D text was selected by default, which caused a D3D driver conflict (common with PCs running MCE2005) that we were unable to resolve. After we changed the screensaver to any other selection, this problem did not happen again.

We also could not get the tuner to recognize our satellite signal at first, which was caused by a conflict stemming from the wrong version of PowerDVD being installed during manufacturing. This issue was quickly fixed via a phone call to tech support and a subsequent short download.

Very similar to the z545 in terms of specs, the DHS 2 is almost as equally weak when it comes to playing games. This is a bit ironic, as the system includes support for the DISCover Console gaming technology (which lets you insert a supported game and start playing, as with an Xbox or PS2). Not that you'd want to—the ATI x300 simply isn't up to handling the job. So DISCover's inclusion is a bit of a gimmick.

And, sporting the same 16x DVD drive as the z545, the DHS 2 gave us installation hassles with standard CDs—it also refused to install *Halo*—while handling all DVD media with ease. (Afraid of the *Halo* benchmark perhaps? Alienware is readying a beefed-up, game-capable PCI-Express version of the DHS 2's big brother—the DHS 5—which should be out later this summer.)

The DHS 2 is very much a close-cousin of the z545 in just about every respect, down to the front-panel access controls (USB, 8-port media-card reader, S-Video, composite, and FireWire port), twin NTSC tuners, built-in Wi-Fi (802.11 b/g), and 5.1 digital and 7.1 surround-sound output. It doesn't have the z545's built-in removable hard drive, but it is slightly smaller than the z545 and, again, cooler.

Alienware includes Gyration's Ultra GT compact wireless keyboard and gyroscopic mouse, which lets you use hand-motion to move the mouse cursor on-screen. After a bit of practice this system works very well, though we're a bit puzzled as to why Alienware's not bundling Gyration's newer Media Center–specific mouse and keyboard (see review, page 46).

While we like the DHS 2's design, unfortunately, its initial setup glitches and over-hyped gaming capabilities keep us from awarding it a higher score.

VERDICT 7 **$2,025**

www.alienware.com

Like the z545, the DHS 2's prolific hook-ups make it very living-room friendly.

The included Gyration gyroscopic mouse and wireless keyboard make couch-surfing comfortable.

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Niveus Media Center: Rainier Edition

Niveus, a small PC shop located in Los Gatos, California, won our hearts with the Rainier Edition. The company's elegant approach to its first Media Center PC has resulted in a cool, nearly silent system that deserves a rightful place in the living room.

That's right, we said silent. While not necessarily critical in conventional desktop PCs, we found silence to be a rare treat while testing Media Centers. Contrary to the nearly complete lack of sound generated by a TiVo unit, the wheezing and whining PC fans regularly drive us crazy. This made the fanless design of the Rainier Media Center extremely appealing. The system's case is essentially one large heatsink and features long, thin fins up and down each side of the chassis. Also gratifying: the lack of any lights on the PC's case. This allowed us to set up the Niveus rig wherever we wanted, without fear of intrusive, movie-disturbing light pollution.

Our test system was spec'd right in the middle of the road in terms of power and performance, with a 2.8GHz Pentium 4, 512MB of RAM, ATI 9600XT, and a 160GB hard drive. (Optional upgrades include a 3.2GHz P4, 320GB hard drive, and nVidia GeForce 6600 PCI-E videocard.) At press time Rainer also rolled out a bigger, beefier version called the Denali—with built-in HDTV support.

The Rainier impressed us with its reliability. It rarely failed to record the programs we specified. Still, any amount of crashing—even two times out of 100—is unacceptable, particularly when TiVo, the Media Center's primary competitor, has a failure rate of well below 1 percent.

Whether we were testing in our living room, office, or bedroom, one thing became painfully clear to us: Any extraneous noise or light pollution sucks, and will greatly diminish your enjoyment of these Media Centers. For this reason, we found Niveus' silent approach, reliability, and sleek design the best of the batch—though the EPIC's a close second. For now, you'll be hard-pressed to find a more appropriate Media Center PC for your needs.

VERDICT 8 **$3,000**

www.niveusmedia.com

iBuyPower Media-XP

Simple and subtle, with a decent amount of power under the hood, iBuyPower's Media Center PC is the most traditional-looking PC of the batch reviewed here.

The Media-XP uses Silverstone's classy-looking LC03 case enclosure, which appears to have been custom-made to house Media Centers. Flip-down doors cover the drives and give the case an elegant living-room aesthetic, and the only light emitted is from a low-level blue LED behind the power button. Unfortunately, the Silverstone case does not excel at reducing noise. While running, it sounds like a small jet—largely a byproduct of the GeForce 5900's obnoxious fan—making it a poor choice for the bedroom or living room. Furthermore, we cut the hell out of one of our fingers sliding off the top of the case—ouch.

A 3.2GHz Pentium 4 CPU and GeForce FX 5900 provide the muscle; the result is a system that's decent for gaming. (iBuyPower's rig placed near the middle of the pack in our benchmark tests.) Stability was acceptable—we experienced only three crashes over the course of recording TV shows and movies.

iBuyPower has made its name building inexpensive PCs that offer solid performance but lack the bells and whistles of more high-end, boutique shops like Alienware. The Media-XP is no exception to this rule: while it does feature an integrated 8-in-1 media reader, there are no other extras. As a result, the rig puts forth a lot of power and won't empty your checking account.

If you can handle the noise level, the Media-XP could make for an acceptable office or small media-room entertainment system.

VERDICT 6 **$1,500**

www.ibuypower.com

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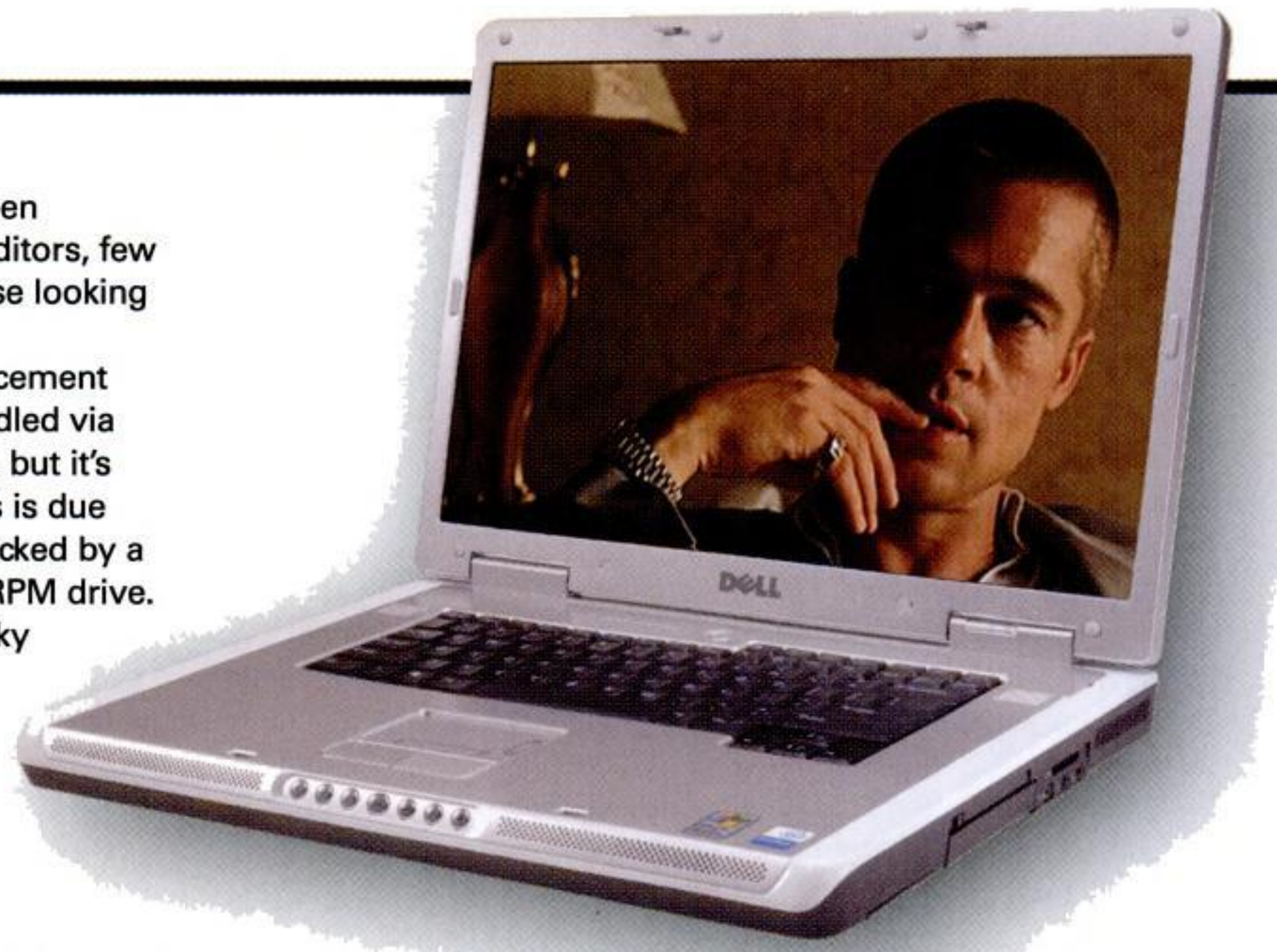
Dell Inspiron 9300

While the size of Dell's new Inspiron 9300 and its screen sparked some debate amongst the *Maximum PC* editors, few could argue that it wasn't a solid performer for those looking for a portable Media Center rig.

Not only did the 9300 perform well as a desktop-replacement Media Center when it came to PVR duties, which are handled via an external USB 2.0 tuner from Hauppauge (see sidebar), but it's also not bad when it comes to games. The game prowess is due to the nVidia Go 6800 video card with 256MB of RAM, backed by a 2GHz Pentium M CPU, 1GB of RAM, and an 80GB 5,200-RPM drive.

At a hair over 8 pounds, the 9300 is lighter and less bulky than it looks. The stylish silver case's slim design makes it easy to carry—though a bit of a challenge to fit in standard laptop cases. At 15.5 inches wide and 11-inches deep—but only 1.6-inches high—the 9300 commands a lot of lap and desktop real estate. It generates a reasonable amount of heat with extended use, even on your lap, considering the horsepower it musters. And battery life's about the best you can expect with a screen of this size, anywhere from 2.5 to 3.4 hours, depending on usage. The full-size keyboard, sans numerical keypad, is comfortable to use and fine for typing.



While a bit large, the 9300 is slim and elegant—and movies look fantastic on the display.

A large, wide-format touchpad matches up nicely with the wide-aspect 17-inch WUXGA display—though it wasn't always as responsive as it should be, particularly with battery power waning. However, the display is clearly the 9300's main attraction, and it's a beauty when it comes to handling movie- and TV-related chores—with a caveat that could be big for some, insignificant to others.

The WUXGA screen's native resolution is 1920x1200, which is excellent for viewing HD and DVD content. However, it comes with a high-gloss finish that is extremely reflective. This can be distracting if you're trying to watch *Kill Bill* in a bright location, or to view the screen from an angle. In typical, direct-view use we found the screen's excellent contrast, which the coating is designed to enhance, to be worth the reflective trade-off.

We did encounter some CD read issues similar to the Alienware and HP machines. Certain multi-CD-ROM programs, such as *Need for Speed Underground 2*, were difficult to install: The machine had issues recognizing the second CD. Also, the case is not as durable as we'd like—after a few weeks of regular use the logo on the top cover was significantly worn, and a few minor chips were found on the corners. And, the dreaded D3D screensaver crash reared its ugly head—3D text was enabled by default. Again, this problem disappeared when we selected another, 2D, screensaver.

The 9300 includes Dell MediaDirect, which lets you quickly resume watching a DVD or listening to a CD with a single button press after the machine has entered hibernation/sleep mode. A set of backlit media control buttons on the front of the case put basic DVD movie and CD music controls within easy reach, as well. We were a bit under-whelmed with the performance of the speakers, however. The subwoofer provides a small, welcome boost with games and action movies, but overall the speakers do not provide as rich a listening experience as we'd like for Media Center duties.

VGA-, DVD-D-, and S-Video-out options are provided on the back of the 9300; as are six USB 2.0 ports. A FireWire port and SD memory card-reader are housed on the right-hand side, next to the headphone and mic jacks. And, for the fashion-conscious, Dell offers optional snap-on covers (blue, cheery burlwood, charcoal, carbon fiber) to personalize the look of your machine. What, no mauve?

VERDICT 8 **$2,990**

www.dell.com

WinTV PVR USB 2.0

Dell ships the Inspiron with an optional USB tuner for $150, the Hauppauge WinTV PVR USB 2.0. While we'd prefer the simplicity and elegance of an integrated TV tuner, such as those Toshiba includes with its Qosmio laptop, we do recognize that you'll likely rarely need a tuner when you take the 9300 on the road—or to the cafe. And the 125-channel cable-ready WinTV tuner is a solid performer when it comes to standard DVR duties. Shows are recorded in MPEG-2 format at a storage consumption rate of 1GB-2GB per hour of video. You can also use it to capture video from old video tapes, with a VCR, and edit it digitally with the included Ulead *DVD MovieFactory 2*.

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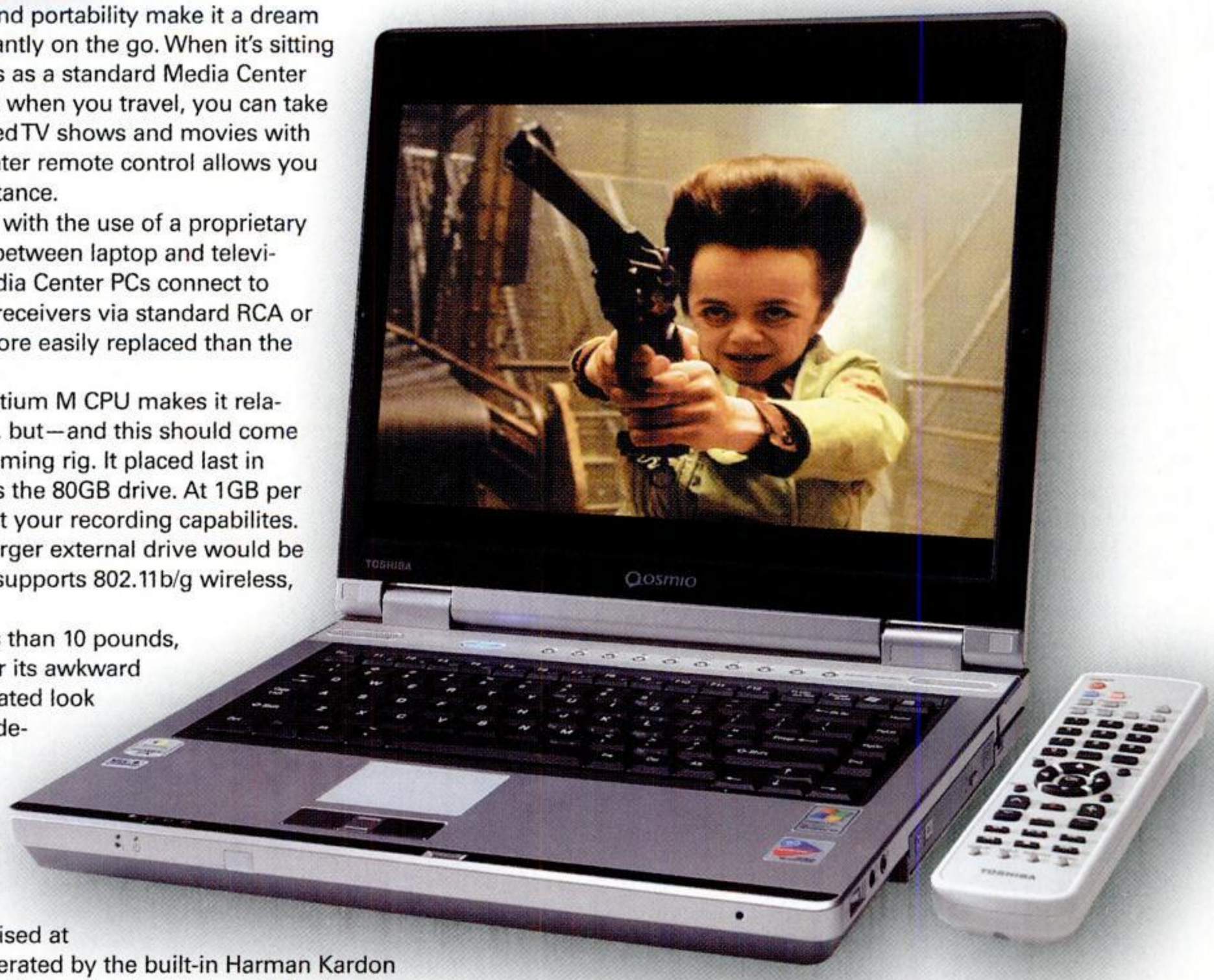
Toshiba Qosmio

The Qosmio's versatility and portability make it a dream for anyone who is constantly on the go. When it's sitting on your desk, it functions as a standard Media Center PC, with the added perk that when you travel, you can take your entire library of recorded TV shows and movies with you. A traditional Media Center remote control allows you to control the OS from a distance.

We have a small concern with the use of a proprietary D-port video-out connector between laptop and television. Traditional desktop Media Center PCs connect to cable boxes and/or satellite receivers via standard RCA or S-video cables, which are more easily replaced than the D-port cable.

The Qosmio's 1.7GHz Pentium M CPU makes it relatively speedy for basic tasks, but—and this should come as no surprise—this is no gaming rig. It placed last in testing. Of greater concern is the 80GB drive. At 1GB per one-hour show, this will limit your recording capabilites. Pairing the Qosmio with a larger external drive would be a good solution. The laptop supports 802.11b/g wireless, as well as Bluetooth.



Weighing in at a little less than 10 pounds, the Qosmio compensates for its awkward name with a sleek, sophisticated look and an awesome 15-inch widescreen display that is one of the best and brightest screens we've ever seen on a laptop. (Toshiba was offering a 17-inch version at presstime, too.)We were similarly surprised at the rich-sounding audio generated by the built-in Harman Kardon speakers, although we were disappointed with the relatively quiet maximum volume setting. Battery life is decent at a little over two hours when playing movies.

One of the most interesting features is the instant-on capability, which allows you to watch DVDs, view live TV via the TV tuner (without the Media Center PVR functionality), and listen to audio CDs. The quality of DVD playback in this mode is inferior to normal Windows-based playback, but it's nice to not have to wait for your TV to turn on. A separate remote allows you to control this non-Windows functionality, which we found slightly baffling. Why not integrate the two?

Road warriors will love Toshiba's novel take on the Media Center, but we'd prefer a straightforward and more powerful PC for our living room. If you carry your laptop around, you're not going to be able to record much TV.

VERDICT 7 **$2,600**

www.toshiba.com

Benchmarks

How do you measure Media Center success? One number at a time.

Benchmarks	Alienware	HP	Niveus	Toshiba	iBuyPower	Dell	Voodoo
Doom 3 (fps)	15.7	10.7	16	3	7.3	31	55
Halo (fps)	NA	NA	21	6	15	47	66.7
Boot Time (sec)	43	40	44	26	34	55	44
SpouseMark (1-10)	7	8	9	8	7	6	7

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How We Test Media Center PCs

Testing Media Center PCs presented the Maximum PC Lab with an interesting and unique predicament. Typically, our system reviews revolve almost primarily around two key factors—performance and reliability. However, Media Center PCs are a unique breed: while performance remains important, we considered real-world functionality and reliability critical. Here are the tests we used:

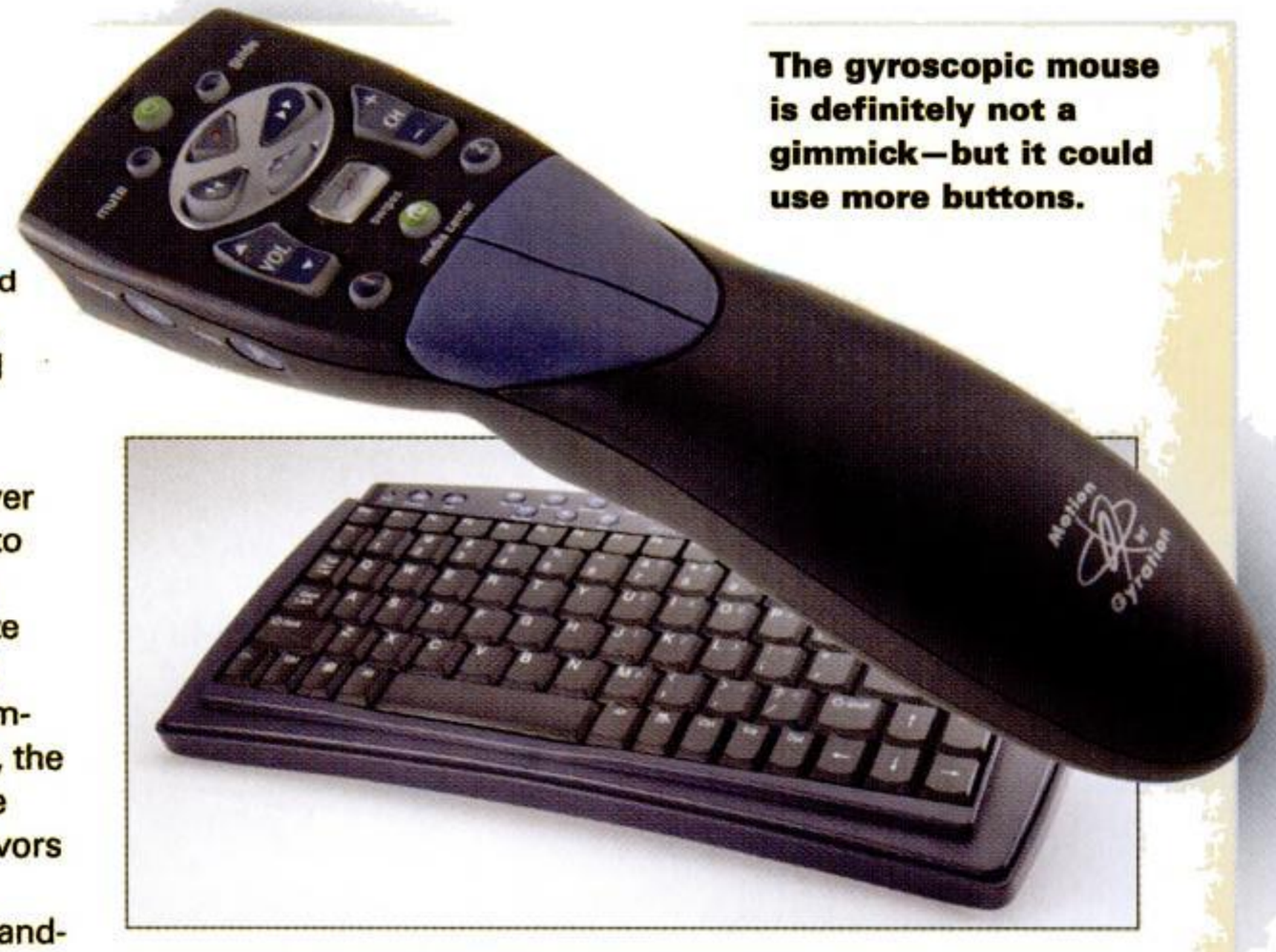
Real-world tests: To test this batch of PCs, we spent two weeks rigorously using each system in our living room. This entailed a large number of hours of TV-watching, but we were up to the task. We recorded at least 25 different programs at the highest-quality level with each rig and tracked the number of failed recordings as a result of crashes or other malfunctions.

A special adjunct to this real-world testing is a rarely used *Maximum PC* test we call SpouseMark 2004. This test entails encouraging our spouse or partner to regularly use the Media Center and report how easy it was to use and how reliable the experience was, particularly in comparison to TiVo.

An interesting side note: During our testing, we discovered that the WinXP Media Center application appears to create a 20-30 percent performance hit in general WinXP computing when the TV-watching capabilities are in use. Gaming performance appears to suffer a more substantial hit during Media Center operation. We'll be investigating this effect more and reporting more specific numbers in future issues of *Maximum PC*.

Benchmarks: After considerable discussion, we pared down our usual suite of system tests to three: *Doom 3* measures high-end gaming performance, *Halo* measures CPU performance, and because we found ourselves turning these rigs off and on so much in order to avoid the noise and heat they generate, we also found it important to measure how long it took for them to boot. In effect, this measures how long it takes to "turn on the TV." ■

Gyration Media Center Suite



The gyroscopic mouse is definitely not a gimmick—but it could use more buttons.

The wireless keyboard is compact, sturdy, comfortable to use, and packed with media functions.

Alienware includes Gyration's original gyroscopic mouse and wireless keyboard combo with its Media Center machines. However, Gyration has introduced a new version designed explicitly for the OS, the Gyration Media Center Remote and Keyboard.

Okay, so clever names are not the company's forte, but clever input devices are. The gyroscopic mouse remote enables you to control your PC by simply waving your remote in the air—the on-screen cursor tracks the motion of your hand. About the size of a standard TV remote, the mouse remote includes standard mouse buttons plus a Media Center home button, two programmable buttons, a guide button, and a Swipes button. However, the number and device keys you'd find on a typical TV or all-in-one entertainment center remote—which the Gyration suite endeavors to be—are AWOL.

The Swipes button lets you program functions to specific hand-motions. So you can make the remote turn up the volume by pointing the mouse up, or fast-forward a DVD by pointing it to the right. This works pretty well, and is certainly cool, but it can't quite make up for the unit's lack of buttons. The mouse remote is great for performing general PC duties and basic Media Center chores, but it's not fully featured enough to be your only remote just yet.

The included GyroTools Media Center software is used to do all this fancy Swipes programming, and while it's effective, it's not extremely user-friendly. There's a bit of a learning curve behind configuring the mouse to do exactly what you might want it to—and another to actually learning how to use it effectively.

We've no complaints about the sturdy, compact, and comfortable wireless keyboard, which includes 15 multimedia hotkeys for such Media Center staples as volume and track controls, and internet and email access.

There's definitely room for improvement, but the Gyration Media Center Remote and Keyboard still represent an effective means to control your Media Center PC from the slouched comfort of your couch.

VERDICT 8 **$179**

www.gyration.com

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The Bi

g Picture

To get the most out of today's Entertainment PC you need a big-screen display. Our buying guide will help you find THE right one for your needs.

With Media Center PCs being designed to be more living room-friendly, the entertainment PC and big-screen TV are now on a collision course. Does this mean we must now abandon those teeny-weeny monitors on our desks and crunch numbers in the living room? Probably not, but gaming on the big-screen is an experience that shouldn't be relegated to the Xbox. And general computing need not be reserved for the den, office, or laptop—plus, who really *wants* to watch movies on a typical PC monitor?

To get the most out of your Media Center PC, you're going to need a big-screen display. However, sorting though the seemingly limitless options out there is a daunting task. We're here to ease the pain with this comprehensive buying guide, which breaks down *all* of the available technologies and rates each for PC compatibility.

Top TV Tech: a Brief Rundown

Big-screen computing isn't a new invention. Gateway was marketing its Destination big-screen PC systems to consumers as early as 1996. A typical setup came with a 31-inch CRT monitor that doubled as a television, a Pentium 133-based computer system running Windows 95, and a wireless keyboard.

How times have changed! Today we have a version of Windows—Windows XP Media Center Edition 2005—designed especially for the living-room experience, and typical Media Center PCs have 3GHz CPUs, 1GB of RAM, and 300GB hard drives. We have cordless input devices such as optical mice, multimedia keyboards, and game controllers. And we're in the midst of a volatile upheaval in the television world—the painful transition from NTSC (the standard North American TV signal we've enjoyed for decades) to HDTV (the amazingly detailed TV imagery of the future). ▶

It may be known for its computers, but Gateway makes a 50-inch, HD-Ready Plasma TV.

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Display Types

The big-screen experience comes in a wealth of flavors. Older technologies are constantly being updated and rendered fresh for new audiences, while new and emerging trends are vying to nab the spotlight. The entire market can be broken down into four different types of displays. We'll look at them in greater detail a little later on.

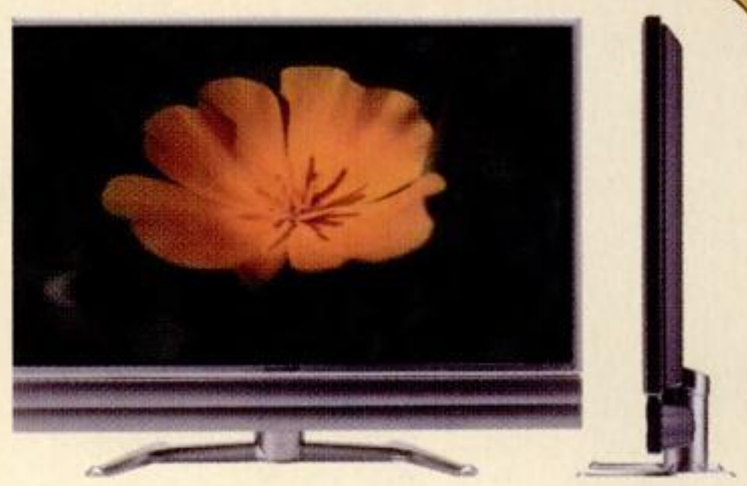
• *Conventional televisions*: The Cathode-Ray Tube isn't dead. CRT technology is sharper and brighter than you'd expect, considering the technology is almost as old as the television itself. While sets are bulky and heavy, CRT televisions are the easiest on your pocketbook.

• *Flat-panel televisions*: With large screens and narrow footprints, flat-panel sets (namely plasma and Liquid Crystal Display) are lighter than their competitors and lend themselves to wall-mounting.

• *Rear-projection televisions*: Available with larger screen sizes than the first two technologies, rear-projection televisions operate just as it sounds: light is focused from behind the screen by a projector inside the television's case. They come in CRT, DLP, LCD, and LCoS varieties. (More on these acronyms in a bit!)

• *Front-projection televisions*: This type of television has been around for decades, but the old-style CRT version is giving way to crisper, brighter LCD-, LCoS- and DLP-based sets. The projector can be mounted on the ceiling or in some other out-of-the way place, and screen size can be downright enormous—well over 100 inches.

It can be hard to find a traditional CRT TV with the latest PC inputs, but they represent an excellent value.



With the largest-sized screen in the direct-view LCD market, the 45-inch AQUOS LCD HDTV features an ultra-wide viewing angle.

The Name Game

It won't surprise you to know that the familiar names you've associated with classic televisions are still around and vying for your dollars in the big-screen arena. Sony, Philips, Toshiba, Samsung, Zenith, Sharp, Hitachi, Pioneer, and other well-known manufacturers are producing sets of all varieties.

And, with the lines between PC and television experiences blurring, PC manufacturers are also getting into the TV market. For example, Dell, Hewlett-Packard, and Gateway market their own plasma and LCD flat-panel television sets, and they're as state-of-the-art as those of the traditional TV manufacturers (see reviews, starting on page 57). Traditional desktop display makers, such as Viewsonic, are in the game as well.

Samsung has unleashed "the world's largest" Plasma television with the 80-inch HPR5072 Widescreen Plasma HDTV.

HD vs. HD-Ready

Some big-screen televisions are capable of decoding high-definition signals by themselves. These are simply called high-definition televisions. Others are capable of displaying high-definition pictures, but lack the necessary decoding ability to actually accept HDTV signals. These require external decoders, in the form of a specialized set-top box or an HDTV-capable cable or satellite receiver, and are called HD-ready TVs (and are often referred to as "HD monitors").

If you get your HDTV signal from cable or satellite, you can get by with an HD-ready television: the cable or satellite box will act as the HD tuner, sending decoded signals to your HD-ready TV. Note that you probably won't be able to tune in to HD over-the-air broadcast signals, however. If your tuner doesn't support external antennas, you'd need *another* HD tuner to go with your antenna. For HD broadcast reception, you're better off going with an HD television with its own internal tuner.

Demystifying Resolution

One of the most confusing aspects of big-screen TV specifications is the pixel resolution and how the set conforms to HDTV (or EDTV—enhanced-definition television) standards. Note that EDTV is a step below HDTV; it's basically standard NTSC but with a progressive, not interlaced, image. There are, in fact, 18 HDTV standards, which, if you ask anybody, is a bit much. Don't worry about that, however. You're interested in which of the basic standards—480i, 480p, 720p, or 1080i—a TV supports.

The numbers indicate the number of horizontal scan lines, and the letters after them mean *progressive* or *interlaced*. Thus, 480i means 480 interlaced horizontal scan lines, which happens to be the NTSC standard. HDTV can be 720p *or* 1080i. Furthermore, 1080p televisions are a recent addition to the market, and their capabilities are even higher than HDTV calls for.

Contrary to the NTSC scan-line standard resolutions, HD pixel resolutions are all over the place. They run from 848x840, through familiar resolutions like 1024x768, and on to lofty heights like 1920x1080. Nearly all HD-ready TVs and HDTVs have an aspect ratio (ratio of horizontal to vertical pixels) of 16:9, which is also referred to as "widescreen."

It doesn't really matter if your HDTV signal comes in at 720p or 1080i, or which pixel resolution your TV is capable of: TVs conforming to both standards can play either signal. They downscale or upscale the images to conform to both standards, and the image quality is stellar in both cases—you'll be hard-pressed to discern the difference. For best use with a PC, don't select a TV with a resolution lower than 1024x768. ►

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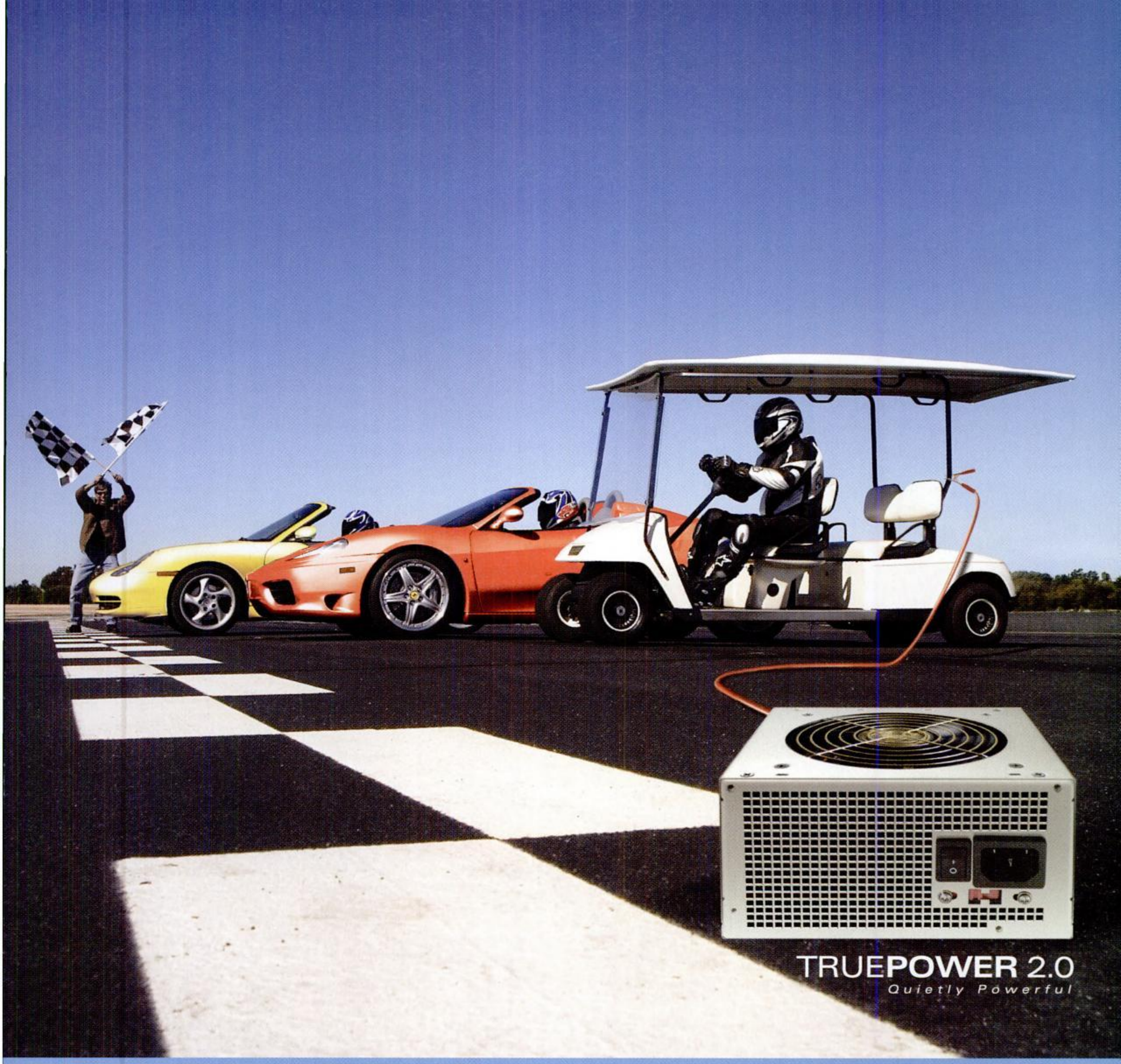

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Displays Defined: Direct-View TVs

Direct-view televisions are sets that create their magic right on the screen at which you gaze; they're the opposite of projection TVs, which create an image in front of or behind the screen. LCD and plasma sets offer the latest in direct-view HDTV technology, but don't count out CRTs just yet. Until the prices of the newer technologies drop, CRT sets will continue to find homes with price-conscious consumers.

Vital Stats for HD-Ready Direct-View TVs

Technology	Price range	Typical footprint
CRT:	$800 (30-in) – $1,500 (36-in)	20-to 35-in deep
LCD:	$350 (for a 14-in PC monitor) – $4,500 (42-in HDTV)	3-to 4-in deep
Plasma:	$4,000 (42-in) – $12,000 (60-in)	3-to 5-in deep

CRT

This is the old standard. Cathode-Ray Tube (CRT) televisions have been around for eons, and the technology hasn't changed all that much.

If you've ever looked at a TV or CRT monitor screen up close—really, really close—you've probably been able to make out itty-bitty dots. By illuminating these dots with electron guns, the television creates its image.

The internals consist of a large vacuum tube, a heated cathode, and a screen coated with phosphor. The phosphor coating is arranged in dots of three different colors: red, green, and blue. The cathode fires up to three focused and accelerated electron beams at the phosphor: a red beam for red dots, blue for blue, and green for green. For a white dot, all three beams are fired at the same dot; for a black dot, none are fired at all. The electron beams cause the phosphor dots to glow, creating the television or monitor image.

CRT televisions weren't always ideal for PC images: NTSC signals are interlaced, causing the image to flicker, and they just weren't sharp enough to display text. They've improved quite a bit in recent years, and some include DVI interfaces. Still, they're not as crisp as LCD televisions—particularly when it comes to text-reproduction duties.

Advantages: Least expensive big-screen TV option; excellent picture quality

Disadvantages: May not be ideal for PC viewing; bulky and heavy; limited screen size (typically, 36 inches is the max); susceptible to image burn-in

PC-to-TV Score: **2** (out of 5)

Due to ship in June, Samsung's Slimfit is a 30-inch CRT with a mere 16-in-deep footprint.

Connector Field Guide

To enjoy the best PC-on-a-TV experience, the television will, of course, need to have PC-type input connectors. Thankfully, most big-screens now do—especially those that use flat-panel and digital technology. Most such televisions have standard VGA inputs as well as Digital Visual Interface (DVI) ports. Invariably, these connectors will result in a crisper signal than fooling with S-Video or composite connections, which are often the only way to connect to old-style CRT televisions.

Here's a breakdown of the most common types of input connectors to be found on big-screen televisions:

F-type coaxial: This is the typical round connector for use with cable television or an antenna. VCRs also use coaxial connectors.

Component video: A set of three RCA-style jacks—color-coded green, blue, and red—carry different components of a high-definition, color signal to the television from devices like DVD players, game consoles, and some high-definition PC graphics cards.

Composite video: Color-coded yellow, this RCA-style jack carries a low-quality signal from devices like DVD players, camcorders, and videogame consoles.

DVI: The connector of choice for carrying digital PC signals, DVI is also used by some HDTV tuners and DVD players.

HDMI (High-Definition Multimedia Interface): This new type of connector carries multi-channel audio as well as high-definition digital signals through the same cable. It's used by some DVD players, HDTV tuners, and HDTV DVRs.

S-Video: A step above composite and below component, S-Video is commonly used by DVD players, camcorders, and game consoles.

VGA/RGB: This is the familiar 15-pin d-sub connector that computers have been using for more than a decade to talk to their monitors.

Note that just because a television has a PC-friendly interface such as VGA or DVI, that doesn't mean it'll support PC resolutions equal to the television's native resolution. Some televisions will only support desktops at 640x480 or 800x600. Not all video cards will support all resolutions offered by the television, especially if they're in 16:9 aspect ratios—many graphics cards only support aspect ratios of 4:3. Check the specs for your graphics card's resolution capabilities carefully and for the "PC mode" operation of the televisions you're interested in. Not all spec sheets will list the PC capabilities, in which case it's best to consult directly with the manufacturer.

Furthermore, you'll almost want to use a progressive-scan resolution as opposed to an interlaced one: interlaced PC video tends to not be as smooth and flicker-free as progressive, especially with white- and light-colored images.

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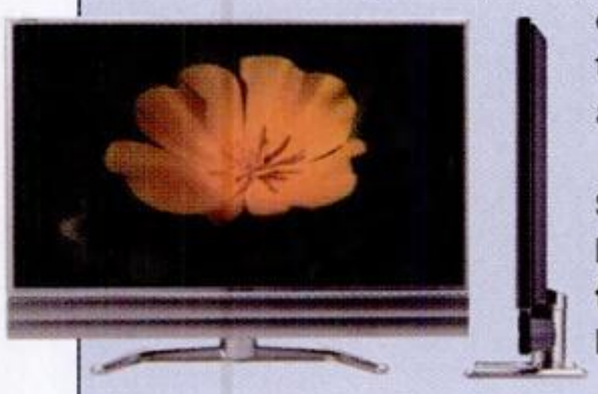
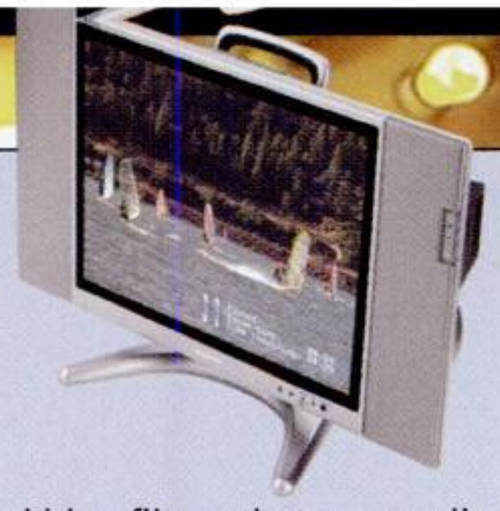
LCD

Using the same technology as LCD monitors, LCD (liquid crystal display) televisions are widely regarded as the best displays for big-screen PC viewing. LCD televisions are very thin, perfectly flat, and serve up some of the sharpest images you're going to find.

The display surface is made up of an array of crystals pressed between two layers of substrate. The crystals exhibit properties of both solid and liquid matter. Each crystal comprises one pixel in the display. A source of light is shone through the panel, and electrical charges make the crystals change shape, causing them to show or block light that attempts to pass through them.



Sleek and stylish, the Sharp LC-37D7U AQUOS LCD HDTV features a bright display with high contrast.



Ideal for PC integration, Sharp's 20-inch AQUOS LCD monitor has dual PCMCIA card slots.

Color comes from red, green, and blue filters that are applied to each pixel.

Because each crystal equals one pixel, LCD displays are incredibly sharp. Most LCD televisions contain DVI and RGB/VGA inputs, as well as composite, component, and other inputs. Their black level—the ability to make darks truly dark instead of gray—is fair, but CRT sets are better in this regard.

Advantages: Very sharp picture; best bet for PC integration; thin footprint; very low risk of image "burn in"
Disadvantages: Some sets have a limited viewing angle; questionable black level

PC-to-TV Score: 5

Plasma

Possibly the most popular—or, at least, the most talked-about—big-screen technology, plasma screens are thin, flat, and sexy.

Plasma displays contain arrays of extremely small fluorescent lights, three per pixel (one red, one blue, and one green). Electrical signals cause the lights to illuminate at varying degrees to create a full spectrum of colors. The term "plasma" refers to the gas that is composed of free-floating ions and electrons within each little fluorescent light.

Plasma displays are still relatively new and haven't been proven reliable for long-term use. Indeed, many early plasma sets have experienced a severe degradation of their black levels, causing dark colors to be washed into blah grays. Until plasma is improved and proven reliable, it might be best to spend the bundle of cash they cost on another technology.

Advantages: Thin footprint; bright display; wide viewing angle
Disadvantages: Suspect black level; expensive; susceptible to image "burn in"

PC-to-TV Score: 4

Hitachi's 42-inch UltraVision Cineform Plasma HDTV supports 1080i HDTV.

Displays Defined: Rear-Projection TVs

CRT, LCD, DLP and LCoS technologies can be used to shine images onto a screen from behind, allowing for very large screen displays. The latter three are often called micro-projection televisions: they're projectors, but with surprisingly narrow footprints. They use mirrors to reduce their footprint. The four are about equal in regards to displaying computer imagery, but images often don't look as sharp as on direct-view televisions.

Vital Stats for HD-Ready Rear-Projection TVs

Technology	Price range	Typical footprint
CRT:	$1,500 (42-in) – $2,500 (60-in)	25-to 30-in deep
DLP:	$3,500 (42-in) – $4,500 (60-in)	18-to 25-in deep
LCD:	$2,500 (42-in) – $4,500 (60-in)	15-to 25-in deep
LCoS:	$2,000 (44-in) – $4,200 (60-in)	15-to 20-in deep

CRT

Huge and bulky, CRT rear-projection televisions take up a lot of space, and can weigh in at as much as three hundred pounds! However, they produce excellent pictures for the money. Similar to direct-view CRT TVs, they employ three phosphor guns—red, green, and blue—and the image is projected onto a translucent screen. The light source, therefore, is the image itself; the light passes through the screen to your eyes. This gives rear-projection CRT televisions excellent clarity and a near-perfect black level.

Advantages: Relatively inexpensive; excellent picture quality and black level
Disadvantages: Gigantic; very susceptible to screen glare—best viewed in dim lighting conditions

PC-to-TV Score: 3

Rear-projection TVs, such as this 57-incher from Hitachi, offer the most-affordable big screens.

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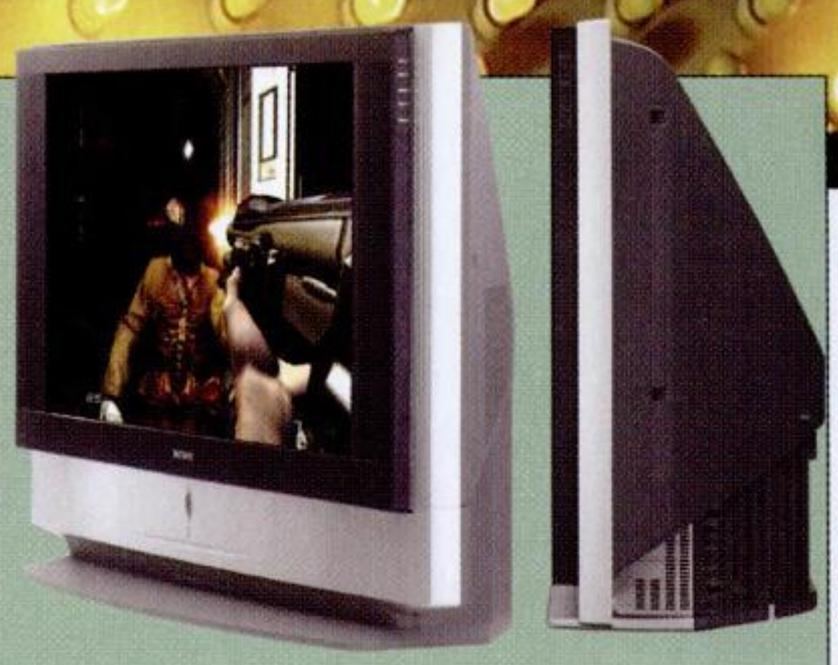
LCD

Light emitting from a lamp is split by mirrors into red, blue, and green beams in these relatively shallow TVs. Each beam passes through an LCD panel, after which the three beams are combined to form an image. That image is projected onto the screen. Rear-projection LCD televisions offer a terrific picture, aside from typically lackluster black levels and one problem associated with the pixel-response time (basically, the LCD equivalent of a refresh rate). Some TVs with slower pixel-response times can be subject to "ghost" images appearing while displaying fast motion. This used to be a problem with direct-view LCD displays as well, but nowadays most manufacturers build their wares with speedy response times. To avoid fast-motion ghosting, the general rule of thumb is to look for a response time of 16ms or less.

Advantages: Excellent picture; relatively narrow profile; resistant to image "burn-in"
Disadvantages: Poor black level; some ghosting associated with fast motion

PC-to-TV Score: 3



Sony's Grand Wega 42-in. LCD projection set shows just how narrow a digital-projection television can be.

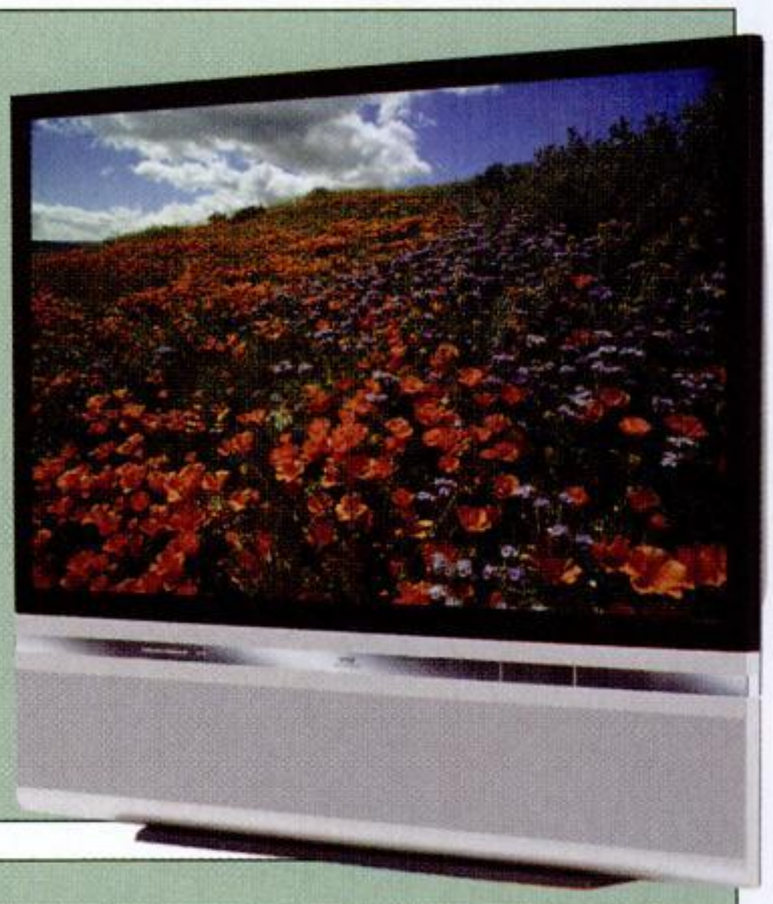
DLP

Digital Light Processing (DLP) sets use microscopic mirrors that are affixed to a semiconductor chip. Light passes through a rotating color wheel and onto the tiny mirrors, which create the projected image.

A small segment of people are able to see a "rainbow" effect when they move their eyes rapidly while looking at a DLP set. It's caused by the color wheel, and for those who are sensitive to it, there's no way to make it go away. Furthermore, the color-wheel motor is a moving part—and an expensive one at that—and moving parts, as anyone who's experienced a hard-drive crash can tell you, fail.

Advantages: Very resistant to "burn-in", very crisp image
Disadvantages: "Rainbow" effect causes some people to see multicolored artifacts with fast eye movement; color wheel motor may eventually fail

PC-to-TV Score: 4



RCA's 50-in. Scenium DLP television is an elegant machine.

LCoS

With a brighter picture and thinner profile than LCD rear-projection TVs, Liquid Crystal on Silicon (LCoS) televisions are also very expensive. These TVs have smaller pixels that create a sharper image. The liquid crystals are actually on a semiconductor chip, backed by a reflective surface. The crystals are excited with electrical impulses to produce a grayscale image, and light is added via a color wheel or by the use of three LCoS chips (instead of one) and a series of beam splitters.

Indeed, it's a finicky system that demands incredible precision, and LCoS televisions are hard to come by. The stellar image produced and the narrow footprint may make them worth looking for—Toshiba, Sony, and Philips all make sets. However, last year, Intel canceled its LCoS development program, abandoning its efforts to further the technology. It might prove smart to wait and see how this technology evolves before jumping into the pool.

Advantages: Possibly the best rear-projection image of all; small footprint
Disadvantages: Color wheel models are subject to failure and the "rainbow" effect; very expensive

PC-to-TV Score: 4

Getting the Signal

What's the point of a new big-screen television without a premium TV service, such as digital or high-definition cable or satellite service? Typically, such services require specialized signal decoders in the form of set-top boxes. They come with their own remotes, their own wiring conundrums, and often their own DVRs and other equipment.

A new technology strives to make life a little bit easier for cable subscribers. CableCARD compatibility is becoming popular among TV manufacturers and cable companies alike. A CableCARD for your television is sort of like a PCMCIA card for your laptop computer: it fits into a special slot on compatible (digital cable-ready) televisions, bestowing the TV with the ability to receive basic and digital cable, and even HDTV signals, without the need for a set-top box. It can include premium channels like HBO and Showtime.

HD-ready TVs will require an external HD signal decoder box, such as this HDTV tuner from RCA.

CableCARD is not without its limitations. A one-way device, it prevents the use of several services, such as Pay-Per-View, interactive program guides, and television-on-demand. These services function only with set-top boxes, which are capable of two-way communication. Two-way CableCARD technology is in the works, but televisions currently compatible with one-way CableCARDs won't be upgradeable. D'oh!

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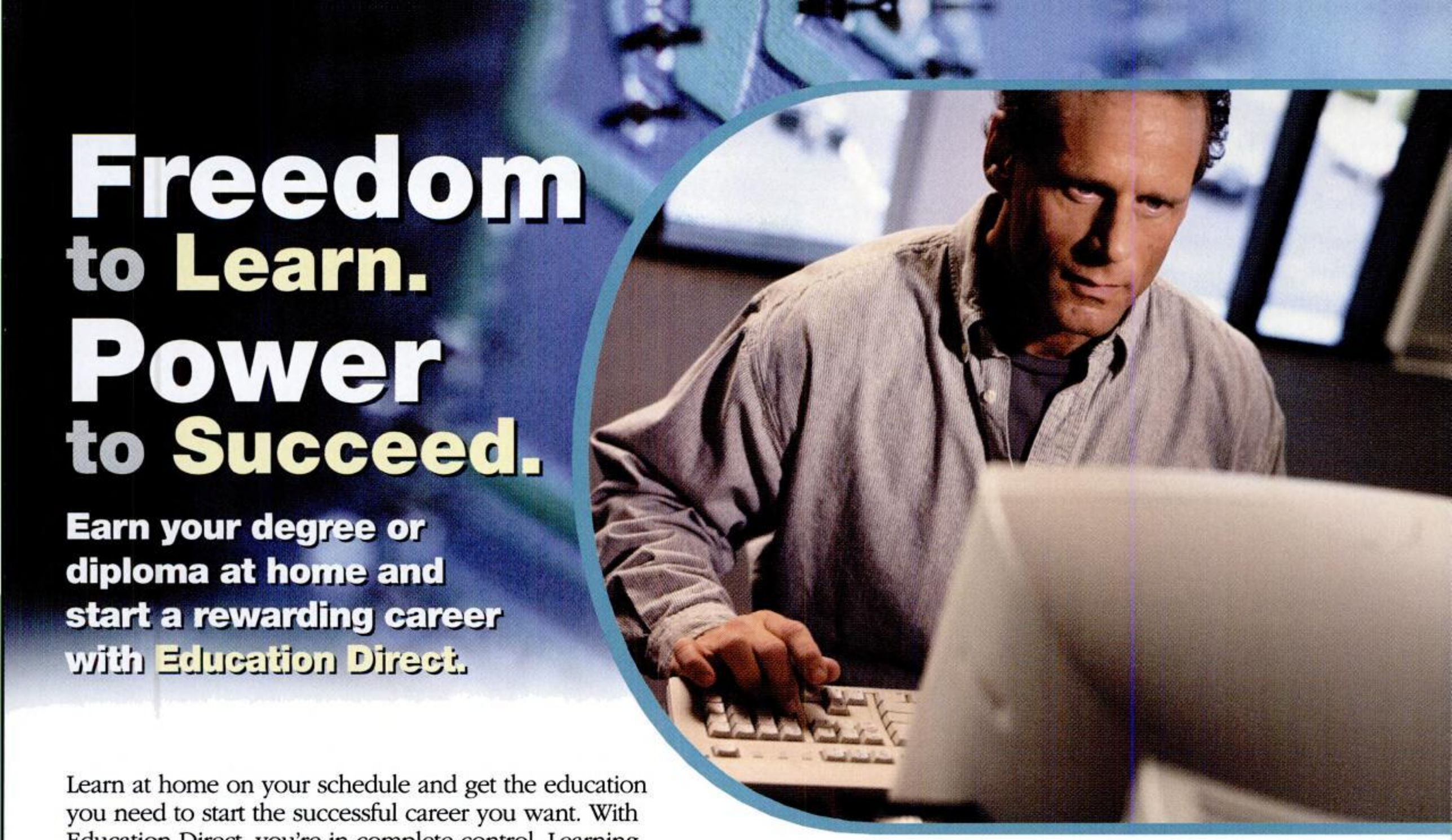

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Displays Defined: Front-Projection TVs

Employing DLP, LCD, or old-fashioned CRT technology, front-projection televisions can foster the largest and highest-quality screens of all. Many, however, do not come with PC-friendly inputs. CRT varieties are the least expensive, but they require frequent calibration, which is best left to professionals. LCD and DLP projection televisions are much more user-friendly and are easy to set up; you can even keep the projector on the coffee table. DLP sets have the best black level, but a typically poor viewing angle; LCD sets are very expensive with a relatively poor black level.

Front-projection televisions demand a lot of space. They require a screen for best performance —this can be a wall-mounted, drop-down screen or a dedicated screen on a stand of some sort. You *can* shine the image on a white wall, but screens are designed to offer the best viewing experience.

In many cases, front-projection televisions demand low light for ideal viewing; although their glassless screens don't foster glare, ambient light detracts from the image on the screen. Projectors require periodic changing of their lamps, and many don't do sound: you'll have to route the audio through a receiver—or your PC. Projectors are usually used for home theater purposes and nighttime viewing of movies. Provided you can eliminate most of the ambient light from a room (including sunlight), a projector can be used as a PC monitor—the huge screen size can make for an awesome gaming experience. However, for day-to-day PC operation, projectors simply aren't practical. ■

While impractical for PC use, HDTV projectors can be impressive with games and movies.

Television Terminology

Aspect ratio: The measured width proportional to the measured height. NTSC televisions conform to a 4:3 aspect ratio, while most HDTVs employ a 16:9 ratio.

Black level: The darkness achieved within the dimmest portions of the screen. Sets with good black level display black objects as truly black; the darks in the images of sets with poor black levels are often grey and washed-out.

Coaxial: Type of cable used by cable television, antennas, and VCRs. It's characterized by two conductors: an inner metal core material (usually copper wire) and an outer metal mesh.

Component video: A three-cable interface for transferring video signals, separated into two color signals and one brightness signal. The connectors are color-coded red, green, and blue. Component video signals are of excellent quality and are most often used by DVD players.

Composite video: A single RCA-style video interface, seen as the poorest-quality video transfer interface short of analog coax. With yellow connectors, it's used by video games and camcorders, among other things.

CRT: Cathode-ray tube, the display technology employed by traditional and some high-definition televisions.

DLP: Digital light processing, a projection technology that creates its images through the use of microscopic mirrors affixed to a chip.

DVI: Digital visual interface, a method of carrying digital signals between display devices; for instance, from a graphics card to a digital monitor or television.

HDMI: High-definition multimedia interface, a single-cord signal carrier that includes high-definition digital signals plus multichannel audio.

HDTV: High-definition television, a crisp television display technology characterized by conforming to 720p or 1080i resolutions.

Interlacing: The act of alternating the drawing of odd and even scan lines to create a video image.

LCD: Liquid crystal display, a display technology that uses special crystals to block or allow degrees of light to pass through a panel.

LCoS: Liquid crystal on silicon, a projection technology that uses liquid crystals on a semiconductor chip to generate an image.

NTSC: National television system committee, which is responsible for 525-line analog television signals (but since some of the lines are used for data, only 480 interlaced lines are drawn as part of the visible signal).

Pixel: The smallest portion of a digital image—a lit or darkened dot.

Progressive scan: Displaying a video image in a non-interlaced sweep.

Resolution: The number of pixels on a screen, usually denoted by horizontal x vertical pixel counts.

S-video: A sharper alternative to composite video, this 4-pin connector is available on most TVs, DVD players, and camcorders.

Viewing angle: The maximum angle from center toward which a television displays a viewable image. A wide viewing angle allows viewers to sit off to the side, while a narrow viewing angle requires viewers to sit directly in front of the television screen.

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Dell W4200HD HDTV Plasma

Finally, a decent big-screen plasma for the "Average Joe"

In this corner, weighing in at a scant 75lbs, we have Dell's W4200HD plasma display. For $3,500 you get a 42-inch screen worthy of the "big" moniker, with a 1024x768 native resolution (60Hz); more input options than you will likely ever need; two built-in tuners—including a dual analog/digital tuner for over-the-air HD; and an included display stand and optional side-mount speakers that actually sound good. Dell runs frequent promotions that bring the tag below $3,000, and such a set would have easily run $5,000 or more just a year ago.

Does it perform? Yes—and it's particularly PC-friendly. With its VGA and DVI inputs with PC audio-in jack, plus a veritable smorgasbord of composite, S-Video, component, HDMI, and RCA audio inputs, you'll be hard-pressed to find an audio/video task this display can not accommodate. Side-mounted S-Video and composite inputs for easy game console/video camera hook-up are an added bonus. And it supports 480i, 480p, 720p, and 1080i digital TV signals.

Media Center is a joy to behold on this puppy: colors are vibrant, images and video are sharp, and text is easy to read from 10 feet to15 feet away. DVDs look very good via the DVI interface—discernibly sharper than with even component inputs. Robust picture-in-picture (PIP) and picture-out of-picture (POP) options mean you can view two identically sized video feeds side by side.

The most notable chinks in the W4200HD's shiny armor is an average (for plasmas) 2,300: 1 contrast ratio and lackluster black-level reproduction.

Just 3.3-inches thick, Dell's 42-inch W4200HD plasma is a sleek display that'll look fantastic in the living room—before you even turn it on.

Dark images do not always look as ink-black as they should. This is a common flaw with plasmas in this price range, however. Less forgivable, the unit emits an annoying hum that modulates in intensity nearly the entire time it's in use. This can be very distracting to say the least—particularly when watching a movie.

Overall, the W4200HD's picture is very good, presenting crisp, colorful, and natural-looking images in its desktop, movie, gaming, and television roles. And its configuration options are second to none. Take out that annoying "hum" and you've got KickAss Award potential.

MAXIMUM PC VERDICT 8

$3,500, www.dell.com

HP PL4245N HD-Ready Plasma

A quieter, darker big-screen alternative

And in this corner, weighing in at 83.7lbs and 4.7-inches deep, we have another 42-inch plasma display from HP—the PL4245N. Ensconced in a classy black piano finish, this display will also enhance the décor of your living room, bedroom, or media room. (Yes, we're the types that view electronic equipment as decorative furniture, rather than something to hide.)

With a better 3000: 1 contrast ratio and proprietary black-level enhancement technology built-in, the 4245N displays richer blacks overall than the Dell. That said, while the picture looks more saturated, colors did not appear to be as vibrant, and the overall picture did not appear quite as sharp—particularly with regular TV. Because of this, Dell's display edged out the HP in every use: movies, TV, games, and general computing—despite the black-level handicap. (We found text slightly easier to read on the HP, however.) Still, the two are very close in performance, and the differences are subtle, and subjective.

The 4245N is a very capable display in its own right that's at home with either standard TV/movie duties or as the anchor for an awe-inspiring Media Center PC. Like the Dell, it sports a native resolution of 1024x768 (60Hz); is capable of displaying 480i, 480p, 720p, and 1080i HD signals; and it offers standard VGA and DVI PC-connection options. It also includes a display stand and optional side-mount speakers.

However, while its full suite of input options—component, composite, S-Video, etc.—is sufficient for most needs, it lags Dell's in terms of flexibility. There's no HDMI input, or side-accessible inputs, for instance. And, while the 4245N includes a dual-NTSC tuner, you'll need an external decoder box to receive HD broadcasts—either over the air or via satellite/cable.

On the other hand, compared to the Dell, the 4245N is nearly whisper

More expensive and less flexible than the Dell, HP's HD-ready plasma is still a solid performer—and it's quiet.

quiet in operation—with only the barest hint of a background "hum", which is a significant plus. And HP includes a basic universal remote that can be programmed, albeit with some difficulty, to control multiple home-theater devices, such as VCR and DVD players and HP's 545 entertainment center PC (see review, page 39).

So this plasma match ends in a draw. Each display is adept at handling PC duties, and each provides HDTV capabilities. We like the Dell's included HDTV tuner, marginally better overall picture, more generous input options, and better price. However, the absence of the Dell "hum" is a huge feather in HP's cap.

MAXIMUM PC VERDICT 8

$3,700, www.hp.com

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Viewsonic N3000W LCD TV

A contender for use in your den or bedroom

Sleek and easy on the eyes, the N3000W's a solid TV and desktop display.

And now, for the middleweight-division display bout: In this corner we have Viewsonic's N3000W, which weighs in at 48.4 pounds and boasts a 30-inch LCD display with a native resolution of 1280x768 (60Hz refresh, 15:9 aspect ratio). Dressed smartly in a silver robe, with the screen trimmed with elegant black, the N3000W looks very nice in a small media room, office, or bedroom entertainment center—and it serves its dual TV/PC display role well.

Connected to a Media Center PC via its DVI input, this baby delivers crisp, colorful images—desktop, movie, pictures, etc.—that look very good at an optimal viewing range of 8 to 10 feet. And it can also handle demanding 3D games such as *Need for Speed Underground 2* with nary a smear or ghost image to be found in its closet. We detected a very small smearing effect in only the most sudden and abrupt changes in direction—but you really have to look for it, hard.

With dual, integrated NTSC tuners, the N3000W is well-conditioned to handle your TV needs, including picture-in-picture duties. Composite, component, RGB, and S-Video hook-ups are also included, so this display can handle anything you might want to throw at it, including HDTV.

So where's this display's weak spot? Actually, it has a couple. First, its 400:1 (typical) contrast ratio is slightly behind the curve right now, and its picture doesn't look as rich or well-saturated as you'll get from its LG opponent below. Second, its 10-watt integrated speakers are vastly underpowered. You'll definitely want to bypass them with a separate set via an A/V receiver or your PC itself. The N3000W speaker's suffice—barely—for TV, but are much too weak for a good action flick or *Call of Duty*. And the bulky remote, though functional, is a step back in time.

These are relatively minor blemishes, and the N3000W is a solid choice overall for use with an entertainment PC. And, considering a display like this would have fetched as much as $4,000 a little more than a year ago, the N3000W is almost a deal at its current price tag of $1,700.

MAXIMUM PC VERDICT 8

$1,700, www.viewsonic.com

LG FLATRON L3200TF LCD TV

Bigger is even better—this time

LG's L3200TF LCD monitor offers an excellent picture and every PC hook-up you could ask for.

And in this corner, weighing in at 57.3lbs, we have an LCD display from LG—the L3200TF. Very similar in appearance to its Viewsonic counterpart above, the L3200TF offers another two inches of diagonal display real estate, and a native resolution of 1,366x768, which translates into a 16:9 widescreen aspect ratio.

Slightly brighter and sporting a higher 500:1 contrast ratio, the LG is not only bigger than the N3000W, but it also delivers a noticeably richer picture. In addition, the included 10-watt speakers deliver a more powerful, ear-pleasing aural experience. And they're detachable (as is the stand, which also swivels and tilts), so you can easily hang the display on a wall and use it with an external A/V system. The speakers don't have any external wires—they connect to the TV audio signal via the screws you use to attach them to the display. This setup is nice it eliminates a bit of the rat's nest that tends to grow behind your TV or computer display.

Like the Viewsonic, LG's offering is also game-friendly, with no discernable ghosting or smearing in *Need for Speed Underground 2*—and its remote offers a pre-programmed picture setting for games. Unlike the Viewsonic, this LCD only has a single NTSC tuner, which means it will do picture-in-picture (PIP) with a DVD and TV or computer window—but not two TV windows. We also found the Viewsonic's menus much easier to use—the L3200TF's zoom function is extremely cumbersome, for example.

The L3200TF supports full picture-in-picture functionality, including side-by-side picture windows. And it's every bit as PC-friendly as the other displays reviewed here, with VGA and DVI PC inputs; PC audio in; and composite, component, and S-Video inputs.

Simply put, the L3200TF's a winner that's equally at home in a bedroom armoire or on the living-room wall.

MAXIMUM PC VERDICT 9

$2,200, www.LGusa.com

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The Shuttle SB86i is a great media server case. It's cool, quiet, and includes decent onboard sound and graphics.

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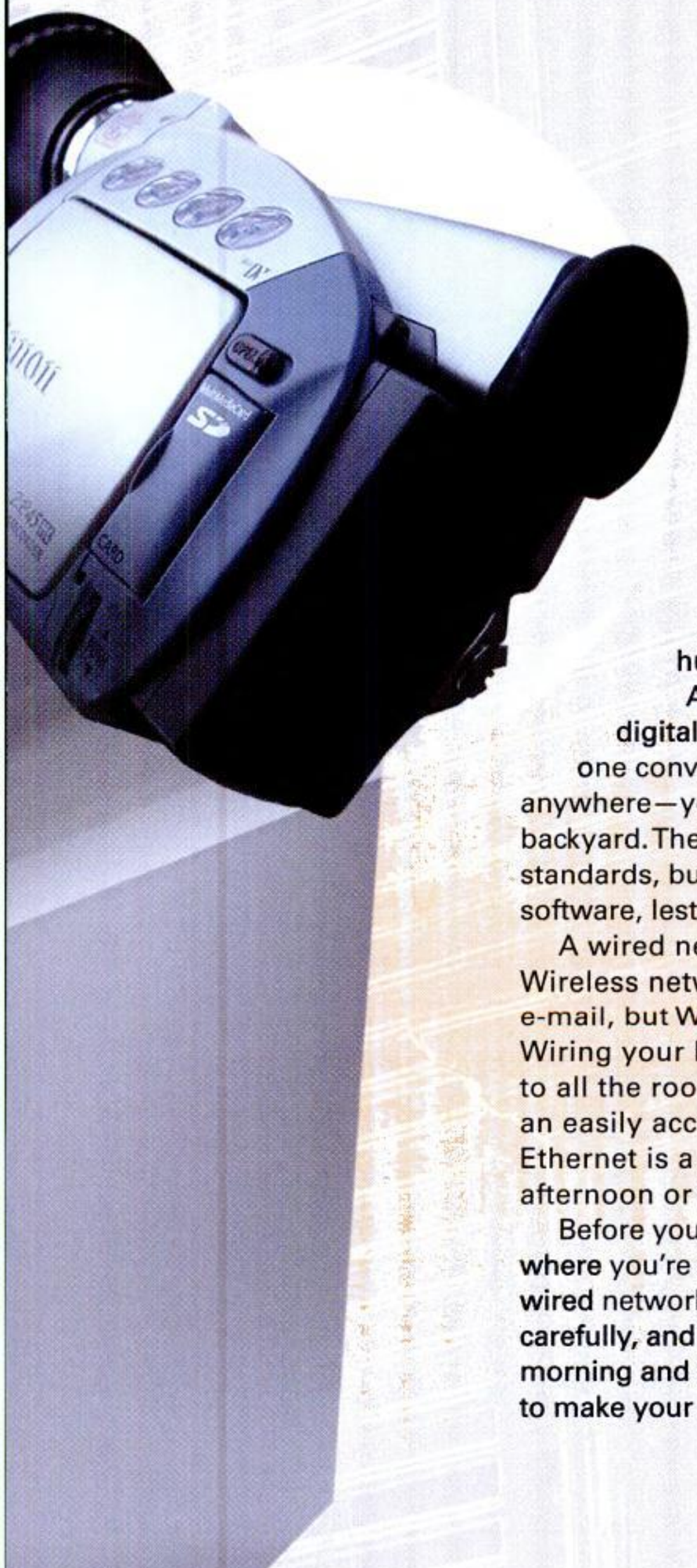

BY MICHAEL BROWN AND WILL SMITH

Sitting in your Barcalounger, you are the master of your digital domain. At your fingertips are 300 recently recorded TV programs, any of which is ready to roll at your command. And digital media privileges are not yours exclusively. In her bedroom, your daughter grooves to a catalog of 25,000 songs, while your wife, nestled cozily in the den, watches any movie from your vast collection. It's all made possible with some strategically placed Ethernet cable and a media server discreetly humming away in a closet.

A powerful media server is the centerpiece of your digital home. Always on, it stores all of your media in one convenient location that you can access anytime from anywhere—your living room, bedroom, or even a laptop in the backyard. The server needn't be a powerful machine by gamer standards, but it must be configured with the right hardware and software, lest your digital dream home become a nightmare.

A wired network is the glue that holds everything together. Wireless networks are great for browsing the web and checking e-mail, but Wi-Fi just doesn't have the legs for streaming video. Wiring your home gives you reliable, lightning-fast connections to all the rooms in your home, and it's easy to do. If you have an easily accessible crawl space, basement, or attic, running Ethernet is a snap. All you need are the right tools and a free afternoon or two.

Before you do anything, read this feature. Make sure you know where you're going to put your server, which rooms you'll run your wired network to, and where you'll rely on wireless. If you plan carefully, and follow our instructions, you can start on Saturday morning and be streaming *Blade Runner* on Sunday night! It's time to make your digital dream home a reality! ▶

INSIDE:

NETWORK YOUR HOME! *page 62*

BUILD A MEDIA SERVER! *page 67*

BUY THE PERFECT STREAMING BOX! *page 70*

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PREPARATIONS

Planning is key to a successful network configuration.

In order to get your network cooking, you need to know where you're going to put your media server, in which rooms you'll want network access, and which rooms will require hard-wired—versus wireless—network access. (If you plan to stream only data and music to a particular room, a wireless access point will deliver plenty of bandwidth, but wireless will support only one or two video streams.) Wired networks are based on a star topology, with cables emerging from a central switch (also known as the home run) to serve all the devices connected to the network.

Because there will be a lot of cables emerging from this central switch, you'll want to keep it out of sight. Consider placing it in a closet or even in the garage. Keep in mind, however, that the switch requires electrical power. At the same time, you'll need to keep your data wiring a safe distance from electrical and magnetic fields, such as AC power lines (at least six inches), electric motors (at least three feet), florescent lamps (three feet), and transformers (three feet).

Once you've settled on a location for your home run, you'll need to decide where to place your network ports. Ideally, you'll place the network ports near the devices you want to connect, on an interior wall of your house. Perimeter walls can be difficult due to low overhead in the attic or crawl space.

Once you decide where to run your cables, you should measure the distance for each run—be sure to measure not only the horizontal distance from the home run to the outlet, but also the vertical distance required for the cable to travel up and down the walls. You shouldn't need to cut your cables until the run is complete, but it helps to know how much wire you'll need when you go shopping.

WHAT YOU'LL NEED

Here are the components you'll need to construct an eight-node network. If you can't find these materials at your local home-improvement store, you can order them online at Tigerdirect.com or Newegg.com.

Infrastructure:

■ An eight-port switch – We used Netgear's GS608, but any gigabit switch will provide maximum speed (**www.netgear.com**)

■ A wireless router – We selected Netgear's WGU624 because it stacks neatly on top of the eight-port switch, and includes four additional Ethernet ports (**www.netgear.com**)

■ Bulk Cat5e Ethernet cable – We chose Cat5e because it supports Gigabit Ethernet; buy more than you think you'll need from Home Depot or any electronics store

■ Cat5e Ethernet patch cables – You'll need two cables for each device you want to connect, available anywhere network gear is sold

■ 20 RJ-45 Ethernet ports – Leviton makes easy-to-install Ethernet ports that mount to any electrical box. We need just 16, but it's good to have extras (**www.leviton.com**)

■ 8 single-port wall plates – The Ethernet ports pop into these, then screw into electrical boxes (**www.leviton.com**)

■ 8 single-gang electrical boxes – We'll mount these in the wall of each room we want to wire. Available at Home Depot

■ 1 dual-gang electrical box – We'll run all the wires for the home run to this electrical box. Available at Home Depot

■ 1 eight-port, dual-gang wall plate – For the home run, we'll use a double-wide electrical box and eight connectors (**www.leviton.com**)

Tools:

You'll need several tools to properly install the network. We got all the networking gear from Leviton (**www.leviton.com**), and most everything else should be available from Home Depot.

■ UTP cable stripper – You could use wire snips to strip the Ethernet, but this device is much easier and safer

■ Punch-down tool for connecting the Ethernet ports – A must-have for tidy networking

This network toolkit comes with cable stripper, crimper, and punch-down tool.

■ Cable pullers – We like to have both pull rods and fish tape to make pulling cables through the walls easier

■ Measuring tape

■ Drill – We recommend an actual corded drill. Cordless models might not have enough torque to bore large holes through stacked two-by-fours

■ Drill bits – One—either an auger or spade type—to drill holes large and deep enough to snake your cable bundles through, and a second, smaller bit to drill a pilot hole for the wallboard saw

■ Wallboard saw – You'll need this to cut holes in your walls for the electrical boxes

Super-long drill bit with cable pullers

Pull rods

Fish tape

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STEP 1: WALLBOARD SURGERY

You won't regret heeding the old carpenter's maxim "measure twice, cut once"

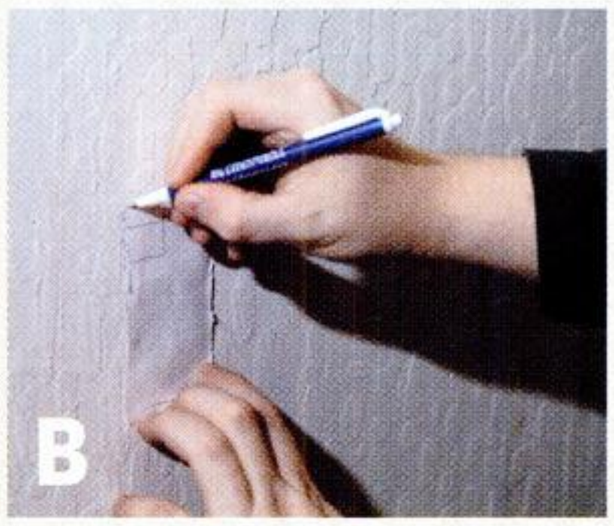
Once you've mapped out your network on paper, you should examine the locations you'll be routing cable to. Although you'll want to limit the number of times you enter your crawl space or attic, it's crucial that you conduct a scouting expedition in one or both places before you start cutting holes in your walls.

In many homes, the declining angle of the roof might make the top of an outside wall inaccessible from the attic. If you have a crawl space—or better yet, a basement—beneath the house, you might be able to run the cable up through the floor instead. In other situations, a two-by-four brace or fireblock midway up the wall could render it impossible for you to snake cable down to an electrical box. You can use an electronic stud finder to quickly identify this potential problem. Insulation in outside walls can also make things difficult—particularly if it's the blown-in type.

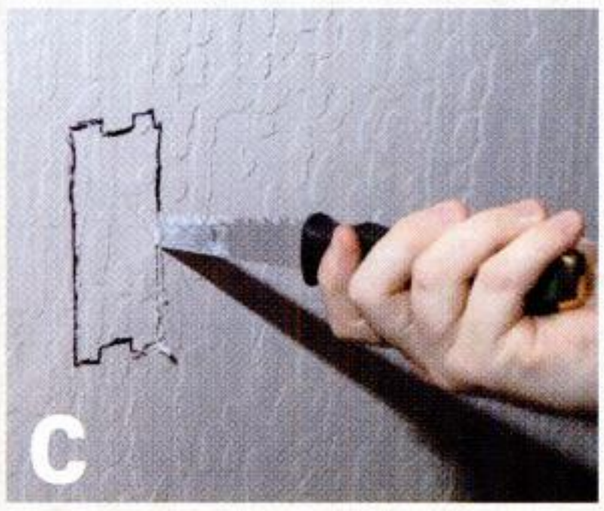
Make sure you have adequate clearance from electrical cables, and be aware of what's on the *other* side of the wall, too. You don't want to cut a hole in the wall only to discover a water pipe blocking your way—or worse, spouting water from a fresh wound.

Lastly, identify a landmark in your home—such as a chimney, a bathroom vent, a heat duct, etc.—that will help you orient your location from within your attic, basement, or crawl space. You'll use that landmark when deciding where to cut holes.

You can use an electronic stud finder (or the old two-knuckle tapping trick) to locate the two-by-four studs in the wall. The stud finder will beep when it detects the edge of the stud; keep dragging until the tone stops to identify the other edge of the stud. Place your Ethernet jack at the same floor height as your electrical outlets, but keep the cable a few inches from any electrical cable inside the wall.



When you buy your electrical boxes, pick up a few of these paper templates. Tack the template to the wall and trace an outline for the hole you're going to cut to accommodate the electrical box. (If you can't find the paper templates, you can trace an outline around the box itself.)



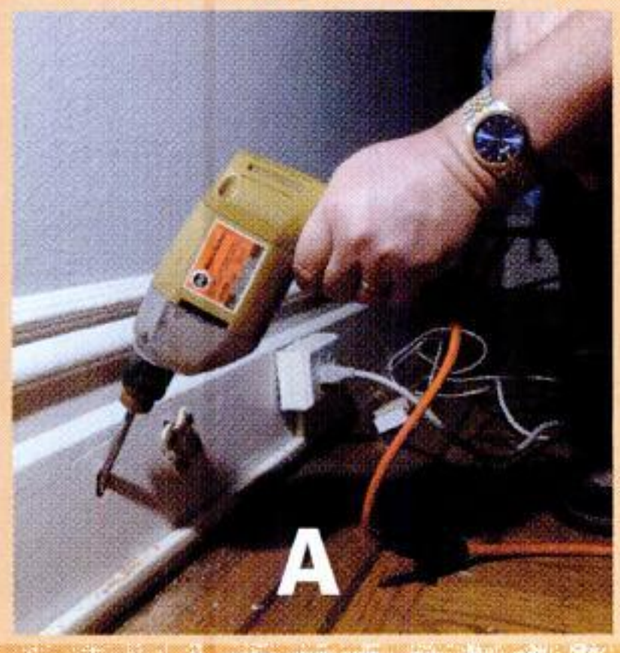
Drill a pilot hole in one of the lines that you've drawn. Insert the wallboard saw into the hole and slowly cut around the perimeter. Don't insert the electrical box until you've pulled your cable through the hole.

STEP 2: PULLING CABLES

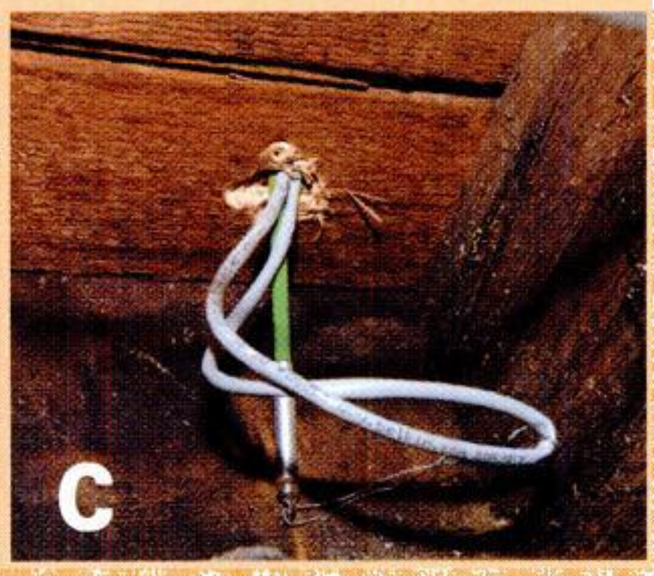
And now the real dirty work begins

If you're fortunate enough to have a basement or first-story garage beneath your living quarters, you won't need to enter your attic at all. Regardless, when you're running cable, start at one end, then run it to the other. Whatever you do, don't start in the basement or attic. Don't forget to bring your measuring tape, drill, drill bits, and your measurements. After you finish the first run, go ahead and pull wires to the rest of the rooms you want to connect.

In this example, we pushed a fish rod down into the basement to help find the hole. Once we've located the hole and made sure it's clear, we attached a cable to the fish rod using 20-ga metal wire, and pushed the looped end of the cable back down into the hole. If you're drilling down from an attic, you'll need to drop your fish tape down the hole between the insulation and the wall, then have a helper tie the end of the cable to that, and then pull the fish tape and cable back up.



If your home doesn't have modern gypsum boards to cut holes in, you can drill down at a very shallow diagonal angle, then mount a wall-mount Ethernet jack on the wall.



Once the cable is visible in your basement, you can begin pulling it from the hole toward your home run. Take care not to bend or crimp the cable. If you must staple the cable, use plastic nonmetallic staples and leave the cable loose within the staple. If you crimp or compress the cable, you'll seriously impair its ability to transmit data. Label or tag each end of the cable before you pull it up into the other hole, so you'll know where it's going to and coming from.

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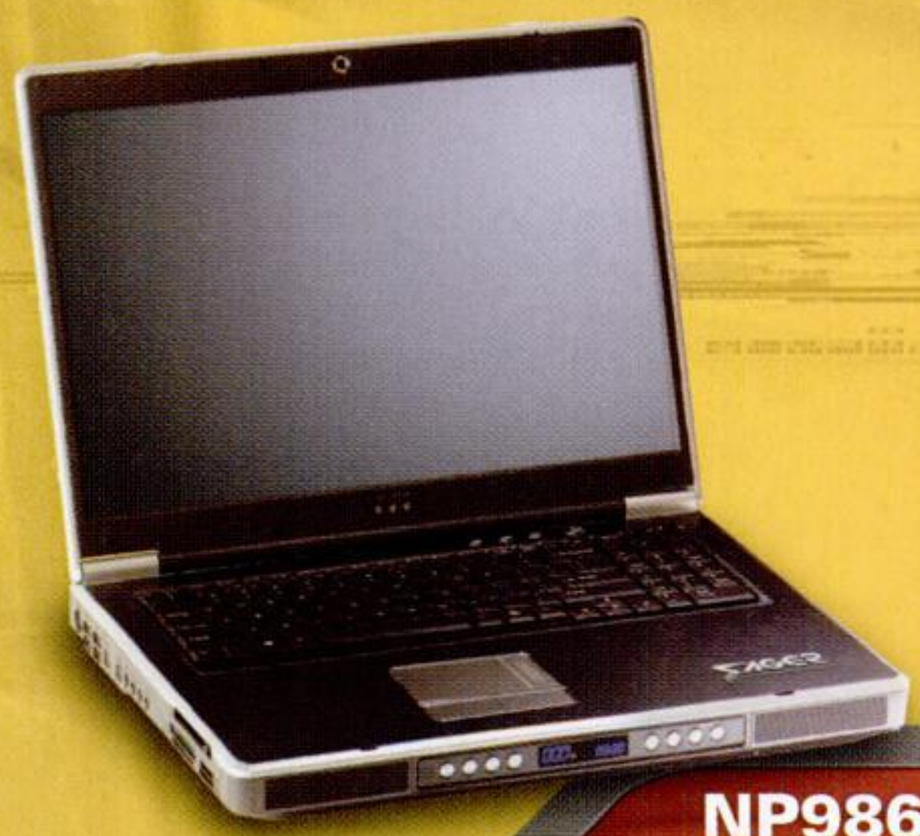
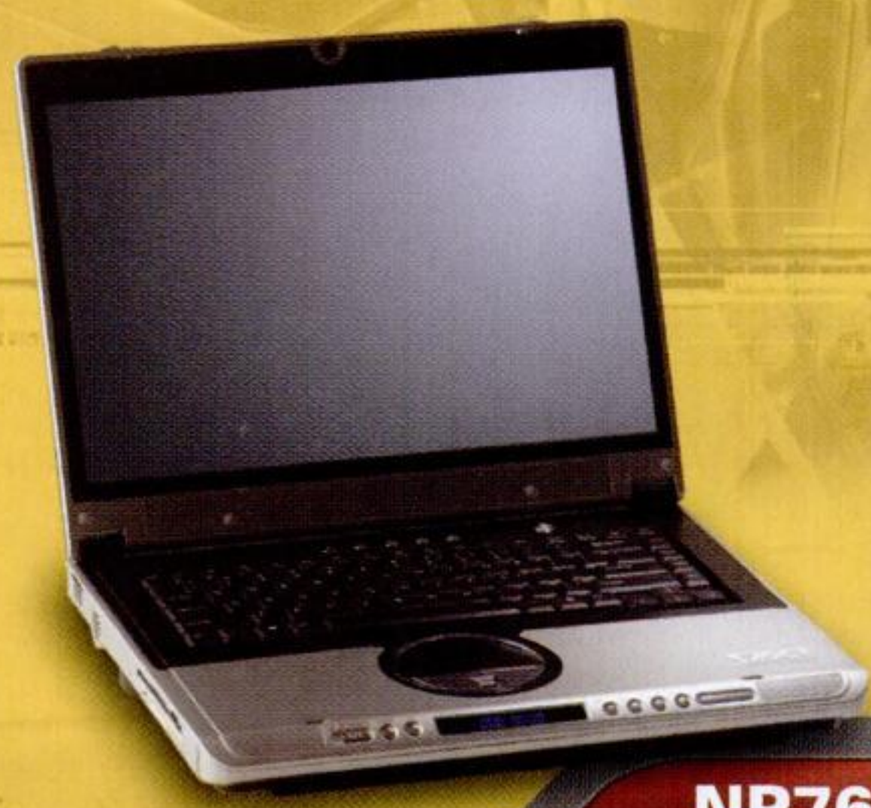


NP9860



NP7620

FEATURES

- Dual Channel DDR2 System Memory supports 400/533MHz, provides the best match for Intel® Processors and enables power efficiencies for data intensive business, multimedia, and gaming applications.
- nVIDIA® GeForce™ Go 6800 PCI-Express™ Graphics Module[5] with 256MB DDR3 Memory delivers true-to-life graphics at blazing speeds.
- The front panel Audio DJ CD player control with separate power switch lets you play your favorite music CD or MP3 while on the go.
- Dual Optical Device bays and Dual Hard Disk Capability allow this system to be customized with 2 CD-ROM devices and 2 Hard Drives coexisting for maximum storage capacity.

OPTIONS

- 802.11g Wireless Module
- 802.11g and Bluetooth Combo Module
- TV Tuner with Remote

NP9860V $2895

- 17.0" Wide Viewing Angles WSXGA+ Active Matrix Display with Super Clear Glare Type Screen
- Intel® Pentium®4 Processor 560 with HT Technology (1MB L2 Cache, 3.6GHz, 800MHz FSB)
- 256MB DDR3 nVIDIA® GeForce™ Go 6800 PCI-Express™ Graphics
- 1024MB Dual Channel DDR2 SDRAM
- 60.0GB 7200RPM Ultra ATA100 Hard Drive
- 8X DVD±R/RW[1] Dual Layer Drive
- Full Size Keyboard with Numeric Keypad
- Front Panel Audio DJ with Separate Power Switch
- Hardware Raid 0,1 Function
- Built-In Digital Video Camera
- Built-In 7-in-1 Card Reader
- 4 Built-In Speakers with a Subwoofer
- External USB 1.44MB Floppy Disk Drive
- Integrated Fax Modem[4] and 10/100/1000 Ethernet
- Microsoft® Windows® XP Home Edition
- Sager's Umbrella Protection Policy

FEATURES

- ATI MOBILITY™ RADEON® X800 PCI-Express™ Graphics with 256MB DDR3 Memory delivers true-to-life graphics at blazing speeds.
- Dual Smart Bays (one fixed/ one versatile) allow this system to be customized just the way you want it. Pick from an optional second battery, secondary HDD, 7-in-1 Card Reader or an additional CD-ROM device.
- The front panel Audio DJ CD player control with separate power switch lets you play your favorite music CD or MP3 while on the go.

OPTIONS

- 802.11g Wireless Module
- Bluetooth Module
- TV Tuner with Remote

NP7620C $1945

- 15.4" WSXGA+ Active Matrix Display
- Intel® Pentium®4 Processor 530 with HT Technology (1MB L2 Cache, 3.0GHz, 800MHz FSB)
- 256MB DDR3 ATI MOBILITY™ RADEON® X800 PCI-Express™ Graphics
- 512MB PC3200 DDR SDRAM
- 40.0GB 5400RPM Ultra ATA100 Hard Drive
- 8X DVD²/24X10X24 CD-RW² Combo Drive
- Front Panel Audio DJ with Separate Power Switch
- Built-In Digital Video Camera
- On-Board 56K V.90 Modem[4] and 10/1000 Ethernet
- Built-In 3-in-1 Card Reader
- 6 Built-In Speakers
- Virtual 8 Channel External Speaker Output
- 3.5" Removable 1.44MB FDD Exchangeable with Optional 2nd Battery/CD-RW/DVD/ HDD Drive/7-in-1 Card Reader
- 3D Enhanced Sound (SPDIF 7.1CH Output for DVD)
- Microsoft® Windows® XP Home Edition
- Sager's Umbrella Protection Policy

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sagernotebook.com

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800.669.1624

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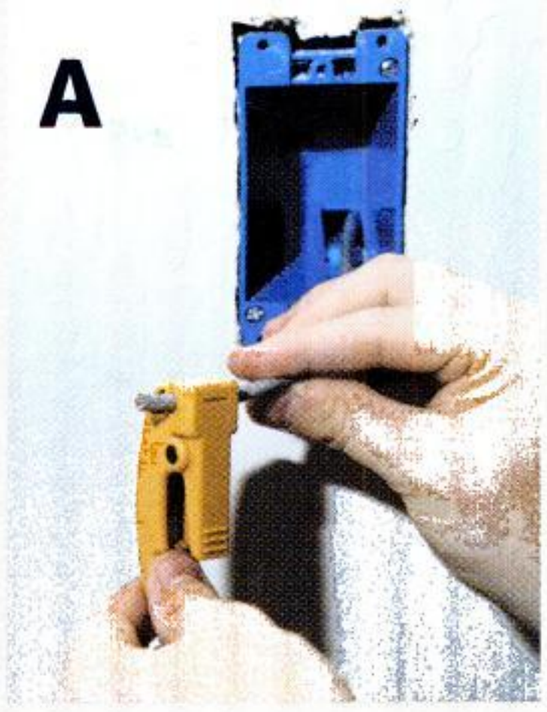
STEP 3: TERMINATE THE CABLES

In other words, attach jacks to the ends of your cables

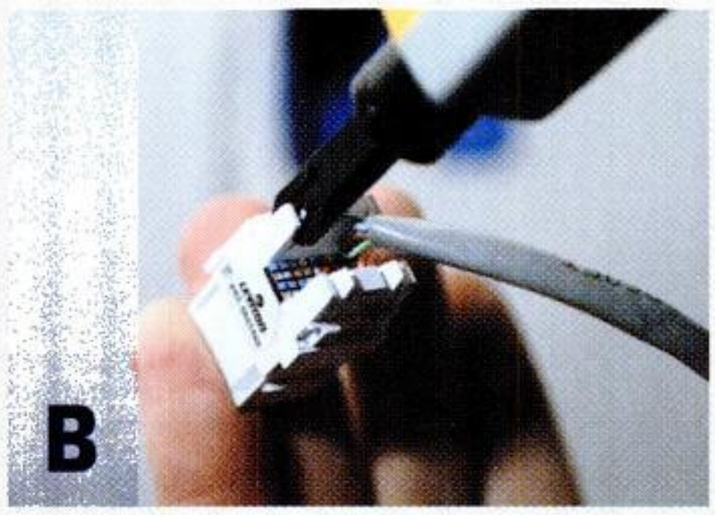
Once you've completed all your cable runs, you'll need to terminate the cables (wire them to Ethernet jacks). Take care to strip no more than one inch of the jacket away from the twisted pairs of wires inside. It's very important that the jacket covers the wires all the way up to the jack; otherwise, you could compromise the cable's ability to transmit data at maximum speed. You'll need a UTP stripper and a wire punch-down tool for this step.

For esoteric reasons we won't go into here, there are two different wiring schemes for terminating Cat5e cables: T568A and T568B. Most jacks and patch panels have diagrams for both wiring schemes, and there's no significant performance difference between the two. The key is that the entire system must be terminated using the same scheme. We've chosen T568A for this example.

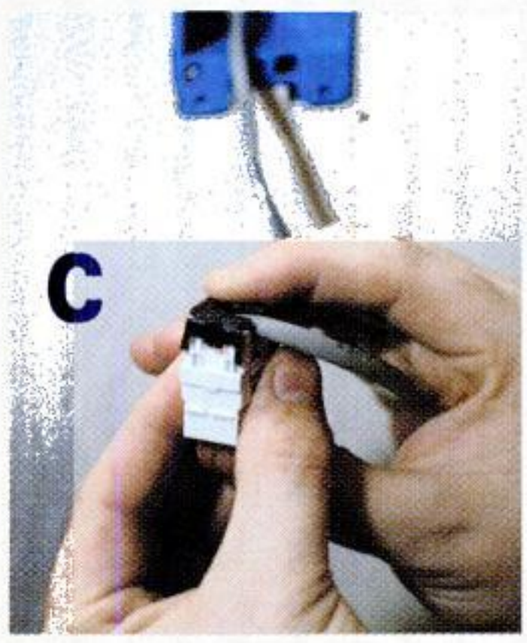
Terminate both ends of all of your cable runs and move on to the next step.



To begin, you'll need to strip the ends of the wire using your wire stripper. Most strippers help align the end of the wires so you trim just the right amount. Trim any excess wire using your wire snips.



Following the T568A wiring diagram on the jack, untwist each pair of color-coded wires and drape them into the matching channels. Using the spring-loaded push-down tool, push each of the wires down into the appropriate channel. When the push-down tool clicks, it snips off the excess wire.

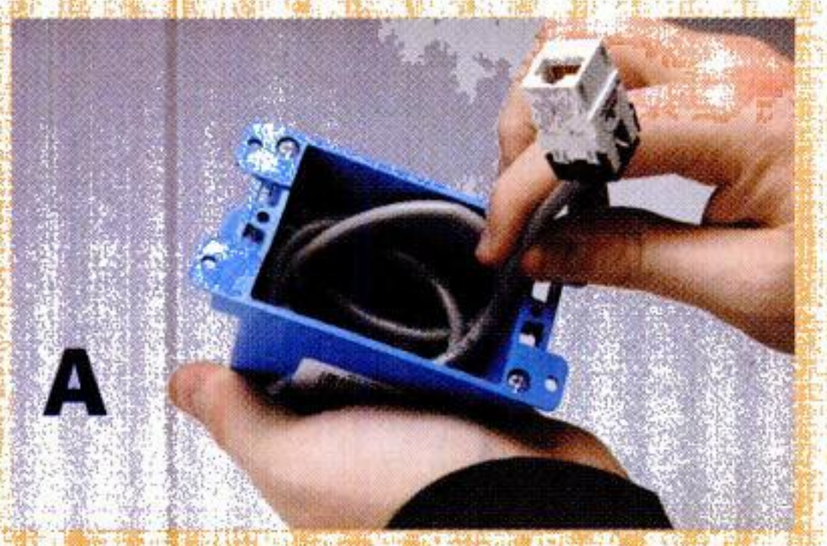


Once you've placed and trimmed each of the wire pairs, run the wire through the channel and lock it in place with the included black cover.

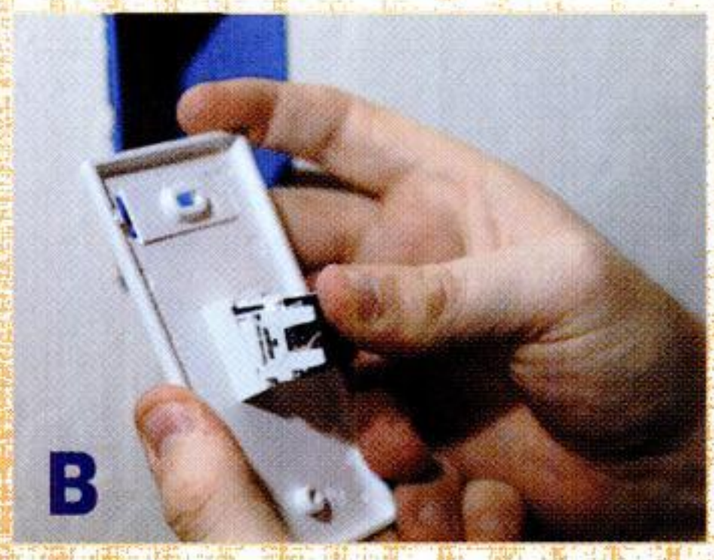
STEP 4: CLOSE YOUR ELECTRICAL BOXES

Tidy up your mess, or face the consequences

You're just about finished with the cabling part of your project. Now all you need to do is arrange all those cables inside your electrical boxes and screw on the faceplates.



To deal with excess cable, coil it loosely inside the electrical box. If you have more excess wire than comfortably fits inside the box, you can push it back inside the wall. Be sure to leave four to six inches of excess wire at each outlet in case you need to reattach a recalcitrant jack.



Push each of the Ethernet jacks into the holes in the backs of the wall plates. They should snap firmly in place. Note that they only go in one way—make sure that the UP label on the jack and the wallplate agree.

Once you've mounted the jacks, you can screw them partially into the electrical box just to get them out of the way, so no unfortunate accidents will occur.

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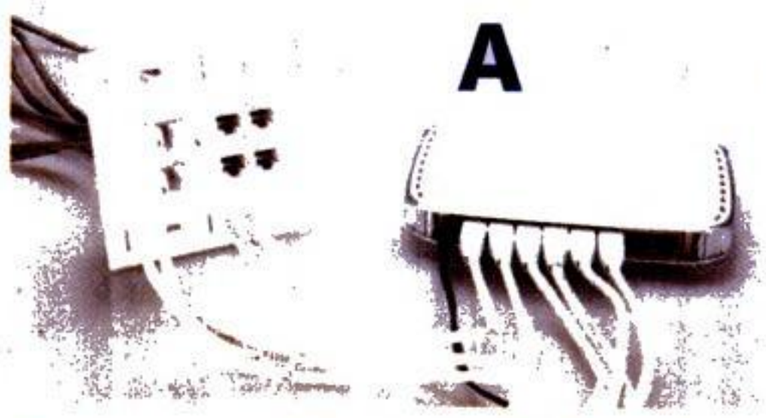
STEP 5: HOOK UP YOUR HARDWARE

Congratulations, you've finished the most difficult part of the job!

Once you've finished your cable runs and termination, your network is nearly complete. But before you move your furniture back into place and pat yourself on the back, you should test your new installation for cable continuity. Because even an inexpensive cable tester—such as Belkin's model F4F314—will set you back about $90, this step is optional. The alternative to testing your cable runs is to finish the project and then test your network by connecting the home run to your switch, then a PC to each of the ports. Once both ends are connected, the green and yellow lights above the network ports on your PC should be lit. If they're not, pop the jacks off the wall and double-check your wiring.



Connect your eight-port switch to the Ethernet jacks in the wall using Cat5e patch cables. (Note: This photo is a dramatic re-enactment. The wiring closet in our test house was too snug to shoot in.)

STEP 6: FINISHING UP

Configure Windows XP and clean up your mess

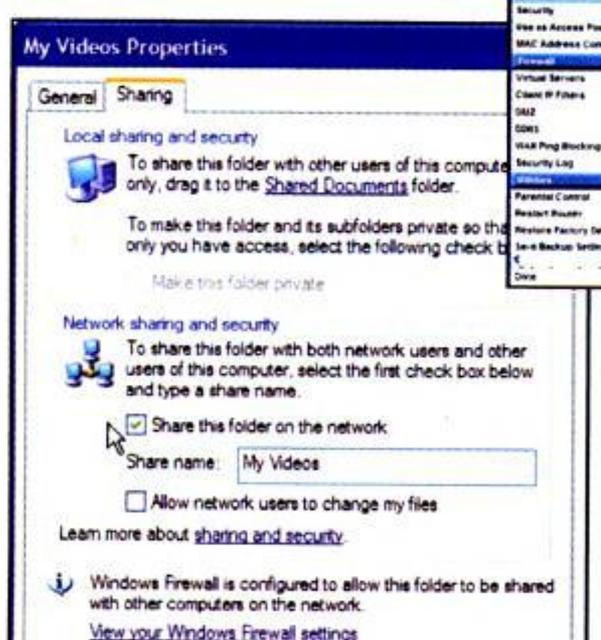
Once you've finished hooking up all your hardware, you'll need to configure Windows XP on your media server to enable file sharing. As long as your router has DHCP turned on, it will automatically dole out IP addresses to all the machines on your network. It's also a good idea to assign a unique name to each PC on the network and make sure they're all assigned to the same workgroup.

If you're setting up both wired and wireless networks, you'll also want to take care to ensure that your wireless network is secure. You can use either Wi-Fi Protected Access (WPA) or the older Wired Equivalent Protocol (WEP) standard. We recommend WPA—you should use it unless your hardware only supports WEP.

After setting up your wireless access point and eight-port switch, plug a PC into the port in each room and test it to ensure you can reach the shared folders on the media server and that you can get onto the Internet. Now your wired network is complete!

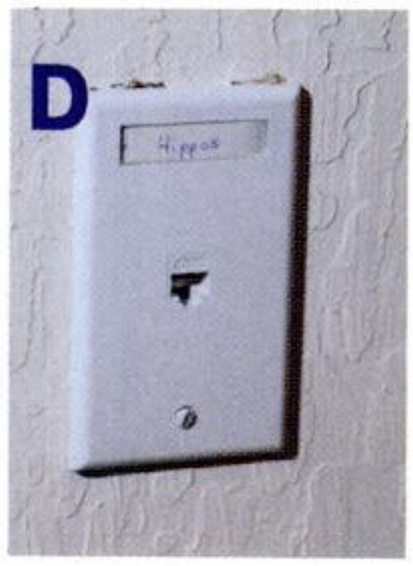
When the green lights come on, you've successfully completed all your hard-wiring!

Right-click My Computer, choose Properties from the pop-up menu, and click the Computer Name tab. Assign each computer a unique name, but make sure they're all assigned to the same workgroup.



Right-click each folder containing music, movies, and other files you wish to share, and choose Properties. Click the Sharing tab and then click the radio button labeled "Share this folder." You may also need to install special software for your streaming boxes later.

The router-configuration process will vary slightly from one router to the next, but they'll all pretty much follow the same basic steps: You'll log on to the router through a web browser, change its default access password and default Service Set Identifier (SSID) to something unique, and enable security.



You remembered to label each of the router ends of the cables, so you know which rooms they're servicing, right? Transfer that information onto the faceplate. The Leviton faceplates we're using provide windows and labels for this purpose.

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BUILD YOUR MEDIA SERVER

In many ways, building a media server is no different than building a normal desktop PC. The basic construction is the same, you'll just make a few different choices along the way. Instead of springing for a $500 videocard, you'll spring for a terabyte of storage. Instead of opting for the fastest CPU, you'll choose a quieter, cooler alternative. Instead of building a lightning-fast gaming rig, you'll build a stalwart server.

We're going to assume you already know how to build your own computer—if you don't, we've posted a step-by-step how-to at MaximumPC.com.

YOUR STREAMING MEDIA SERVER QUESTIONS ANSWERED

Q: What makes a server different from a normal PC?

A: Not a whole lot. In fact, many servers are virtually indistinguishable from a typical desktop machine you would use at work. The main differences are subtle. Typically a server will include more hard drive capacity than a standard desktop, and will include some features to improve reliability, like an uninterruptible power supply and automated backup software.

Q: What kind of case should I build my server in?

A: We built our media server in a small-formfactor case—the Shuttle SB86i—but you can use any case you have lying around. The SB86i features two hard drive bays and a chipset with decent onboard sound and graphics, but it's still small enough to fit on a closet shelf. The downside to small-formfactor machines is a lack of expandability—using the largest drives on the market, we capped out at about 800GB of total storage. If you have a huge media collection, you might want a larger mid-tower case.

Q: What hardware does a streaming media server require?

A: Your server's minimum system requirements depend on what kind of content you plan on streaming. To just stream audio and video files around your home, you don't need a whole lot of horsepower. Pretty much any old machine will work for audio, but you'll want at least a 1.5GHz machine for video.

That may not be enough if you have more advanced requirements. If you intend to transcode your music or video—that is, convert it from one format to another on the fly—you'll need significantly more juice under the hood. Transcoding may be necessary if you rip your content in one format—MPEG-4 or MPEG-2—for instance, but your streaming box only reads another format (say, WMV9 or QuickTime). Whether or not you'll need to transcode depends on the type of box you stream your content to. Some products support multiple formats—including popular MPEG-4–based formats like DivX—while others support only the less efficient MPEG-2 format.

Regardless, if you're going to transcode your content, you'll need lots of CPU juice. A 2.4GHz Pentium 4 with 1GB of RAM is the bare minimum for one stream at a time. You'll need more processor and RAM power if you plan to transcode more than one video at a time.

Q: What kind of software do I need to put this all together?

A: There are several different PVR software packages available for the PC, but some work better than others. An ideal PVR package will capture and encode your favorite TV shows, give you a way to schedule or change recordings remotely, and even transcode your shows to different formats. There are several software packages that perform one or two of these functions, but our favorite is Snapstream's *BeyondTV 3*. It does everything we need, is very reliable, and works well with many different TV tuners and remote controls.

Another fine option is Windows *XP Media Center Edition 2005*. Even though *MCE2005* is designed to be used in the living room, it works very well as a server OS. Using Media Center Extenders—specialized streaming boxes designed to work exclusively with *MCE2005*—you can stream your shows from one MCE box to any room in your home. Check the sidebar on the next page for more on *MCE2005*.

Finally, anyone with Linux experience should check out *MythTV*. Although it has the shortest compatibility list for TV tuner cards and remote controls, its advanced features make it a strong contender. In addition to standard PVR functionality, *MythTV* supports DVD ripping, as well as sharing recorded programs with every other *MythTV* machine on your network, seamlessly. Best of all, it's free and open source.

Q: What about the operating system? Should I look at Linux or Windows Server 2003, or just use Windows XP?

A: For most people, Windows XP Professional will work just fine. In fact, because there's no Universal Plug and Play support in Windows Server 2003, many of the new streaming boxes that use *Windows Media Connect* software, which requires UPNP, simply won't work with Windows Server 2003. Some ▶

Ingredients for a Media Server

- ➤ A reasonably fast PC – 2.4GHz or faster with at least 1GB of RAM
- ➤ TV tuner(s) – We recommend the ATI TV Wonder Elite and the Hauppauge PVR-250 cards for best image quality and a good price
- ➤ Remote control – If you plan on connecting your media server to a TV, you'll need a remote. ATI, Snapstream, and Microsoft all have remotes, so get the one that matches your config
- ➤ IR blaster – You'll need a way to change channels on your cable or satellite receiver. You can get an IR blaster from **www.snapstream.com**
- ➤ PVR software – You'll need appropriate software: either *Windows Media Center 2005* (**www.microsoft.com**) or *BeyondTV 3* (**www.snapstream.com**)
- ➤ Lots of internal storage – Video takes up lots of space. DivX-encoded movies will absorb 700MB each, and your recorded TV shows will use about 1GB per hour
- ➤ External backup drive – To protect your data should you suffer a virus attack or hard drive failure

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software, including *BeyondTV*, doesn't work properly with Windows Server either.

The nice thing about Linux is that it allows you to take advantage of the aforementioned *MythTV*, which may be a little rough around the edges but is nonetheless a perfectly viable alternative to *MCE2005* or *BeyondTV*, and it's free. Keeping a Linux box up, running, and secure, however, can be more of a challenge than keeping XP patched and installed.

Q: Where should I store my server?

A: Any kind of well-ventilated closet with power and a wired Ethernet connection will work. If you use a linen closet, make sure there are a couple of inches on each side—including the front and back—for air to circulate around the case.

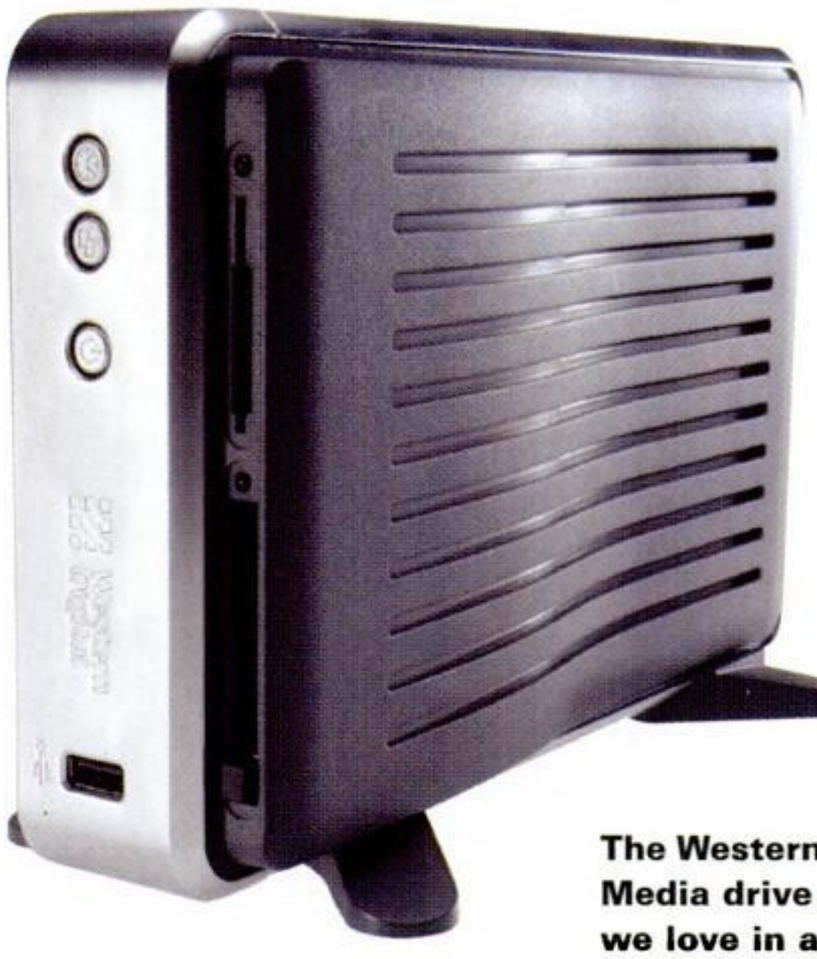
Q: What's a headless configuration? How can I configure it for my machine?

A: A headless configuration is one without a monitor, keyboard, and mouse. Once Windows XP is installed, you can enable Remote Desktop, which lets you connect to the desktop of your PC from another XP machine. Using Remote Desktop is just like logging into your machine, but you can do it from anywhere! You can install applications, configure software settings, and even reboot the machine.

Once Remote Desktop is enabled, you can disconnect the mouse, keyboard, and monitor. To enable Remote Desktop, open your System control panel, then go to the Remote tab, and check "Allow users to connect remotely to this computer."

Q: What should I do to keep my data backed-up?

A: We recommend that you store your files on a mirrored RAID array, and perform frequent backups. RAID will protect you in the event of a hard drive failure, but it can't do anything to protect you if a virus or worm erases your media files. External backup drives—such as a Western Digital Media Center 250GB drive—include software that lets you automatically schedule periodic backups of your crucial media folders.



The Western Digital Dual-Option Media drive offers everything we love in a backup drive. Its software works flawlessly, and it even has a media reader on its front.

THE SCOOP ON MEDIA CENTER EDITION 2005

Using *MCE2005* for your streaming media server involves a few extra steps, tricks, and tweaks, but for someone who wants to stream media to multiple rooms in one house, *MCE2005* and Media Center Extenders provide a turnkey solution.

Q: How do I get Media Center Edition 2005?

A: You can buy a new PC with *MCE2005* installed on it, but you won't be able to purchase a stand-alone copy of the software at Best Buy or any other retail stores. It is possible, however, to purchase *MCE2005* online, if you also purchase a qualifying piece of hardware. Hardware websites, such as Newegg.com, and many vendors listed on Pricewatch.com will sell *MCE2005* if you also buy a hard drive, for instance.

Q: What are the system requirements for MCE2005?

A: System requirements are similar to those of any streaming server; the big difference is the list of compatible TV tuners. *MCE2005* requires a hardware MPEG-2 encoder on each TV tuner. Hauppauge PVR-150 and higher tuners work fine, as does the new ATI TV Wonder Elite. You'll also need to buy a *MCE2005* remote and a compatible IR blaster to control your cable or satellite box. Both the remote and the IR blaster should be available from the vendor that sells you your copy of *MCE2005*.

Q: How many Extenders can I connect to MCE2005?

A: *MCE2005* can connect to up to five Media Center Extenders to stream videos and music to separate rooms of your house.

Q: What's the downside to MCE2005?

A: Unlike more open applications—such as *BeyondTV* and *MythTV*—*MCE2005* is rife with digital-rights management technology. Microsoft is firmly in bed with the content providers, offering them advanced DRM features that really screw the consumer. DRM lets Microsoft prevent you from using certain features on a per-show basis. For example, you may be prevented from archiving certain shows to DVD or saving some shows for more than a specified period of time. In our eyes, this is a big negative for *MCE2005*. ►

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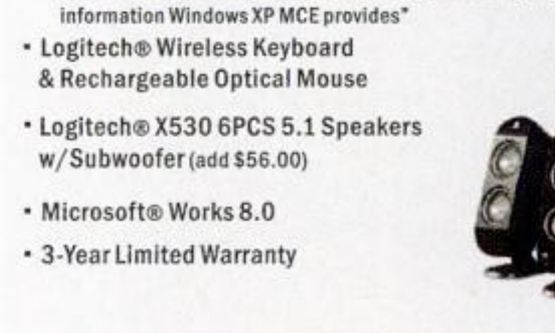

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BUY THE PERFECT STREAMING BOX

You've got your home network up and running, and you've built your media server. All you need now is something to turn the bits stored on your media server into audio and video on your TV. Lucky for you, that's exactly what these boxes do! Once you purchase a streaming box, getting it going is as easy as connecting the device to your TV and network, and then installing its software.

Buffalo LinkTheater

Let's start with the most versatile, easy-to-use product in our roundup. The LinkTheater not only connects to your network and streams audio and video across your wired or wireless LAN, it also includes an integrated DVD player. Setup was ludicrously simple; in fact, the LinkTheater began working before we'd even installed its server software. It hitched onto another Universal Plug and Play server that was already running on our LAN. That's the way a streaming box should work.

The LinkTheater handled every video format we threw at it, including DivX, Xvid, WMV, and even straight MPEG-2, without a hitch (it wouldn't, however, play QuickTime movies). We're especially impressed with the video quality of the streamed content. This LinkTheater video looked as good as or better than it does when played directly on our PC monitors.

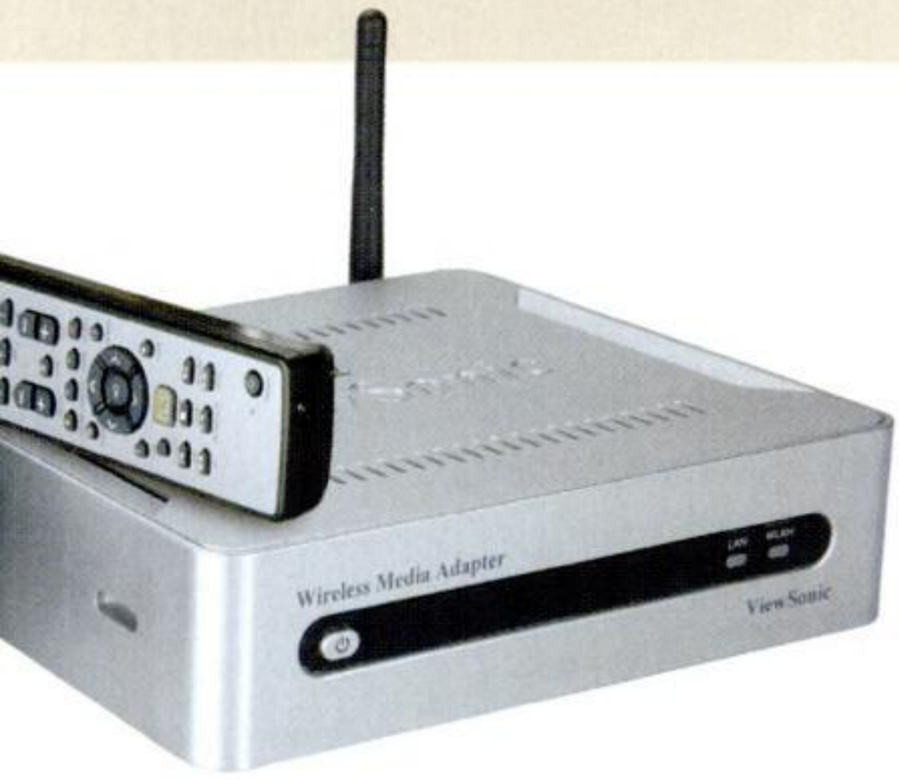
Unfortunately, we weren't as impressed with the LinkTheater's handling of music files. The box choked when presented with a mere 8,000-track library, and sound quality left something to be desired. We therefore don't recommend the LinkTheater for audio streaming; you'd be better served by a stand-alone audio streaming box—such as Slim Device's Squeezebox (www.slimdevices.com) or Sonos Jukebox (www.sonos.com).

Also included in the LinkTheater package is a rudimentary web browser. We're not enamored of set-top browsing, but it's an option that no other streaming box here offers. Although the server app will pull your bookmarks from *Internet Explorer* or *Firefox*, we'd prefer it to go a step further and give us the news-feeds directly from our favorite sites.

The Buffalo LinkTheater streamed great-looking video in damn near every format we tested.

MAXIMUM PC VERDICT 8

$350, www.buffalotech.com



Viewsonic WMA100

Viewsonic's contribution to the streaming-media scene is the WMA100. Like Buffalo's LinkTheater, the WMA100 streams multiple video formats using a basic UPNP server. Unlike Buffalo's product, however, the WMA100's interface is clunky, slow, and difficult to use.

Once we got video playing with the WMA100, it looked and sounded quite good. It choked on some Xvid-encoded videos, but played nearly everything else with aplomb. Colors were crisp and clear, and the image held up even in scenes with lots of fast motion. Unfortunately, when playing a ripped DVD, the device doesn't provide you with any of the typical DVD options, so you can't choose subtitles or an alternative audio track. Furthermore, the WMA100 is incapable of piping an analog signal to your stereo via the SPDIF, which forces you to change inputs on your stereo every time you switch files. That's just goofy!

In the end, we see no reason to recommend this adapter over Buffalo's LinkTheater.

MAXIMUM PC VERDICT 6

$300, www.viewsonic.com

Apple Airport Express with iTunes

Apple pitches the Airport Express as an easy way to stream audio from your computer to your stereo. Unfortunately, nothing could be further from the truth. Because the Airport Express' original function is as a wireless router, it's difficult to configure it as a streaming media device. And once you have the Airport Express up and running, the experience is disappointing. Each installation of *iTunes* can play to only one location at a time. For instance, if you're streaming songs to your living room from your office, you can't listen to songs using *iTunes* in your office.

MAXIMUM PC VERDICT 4

$130, www.apple.com

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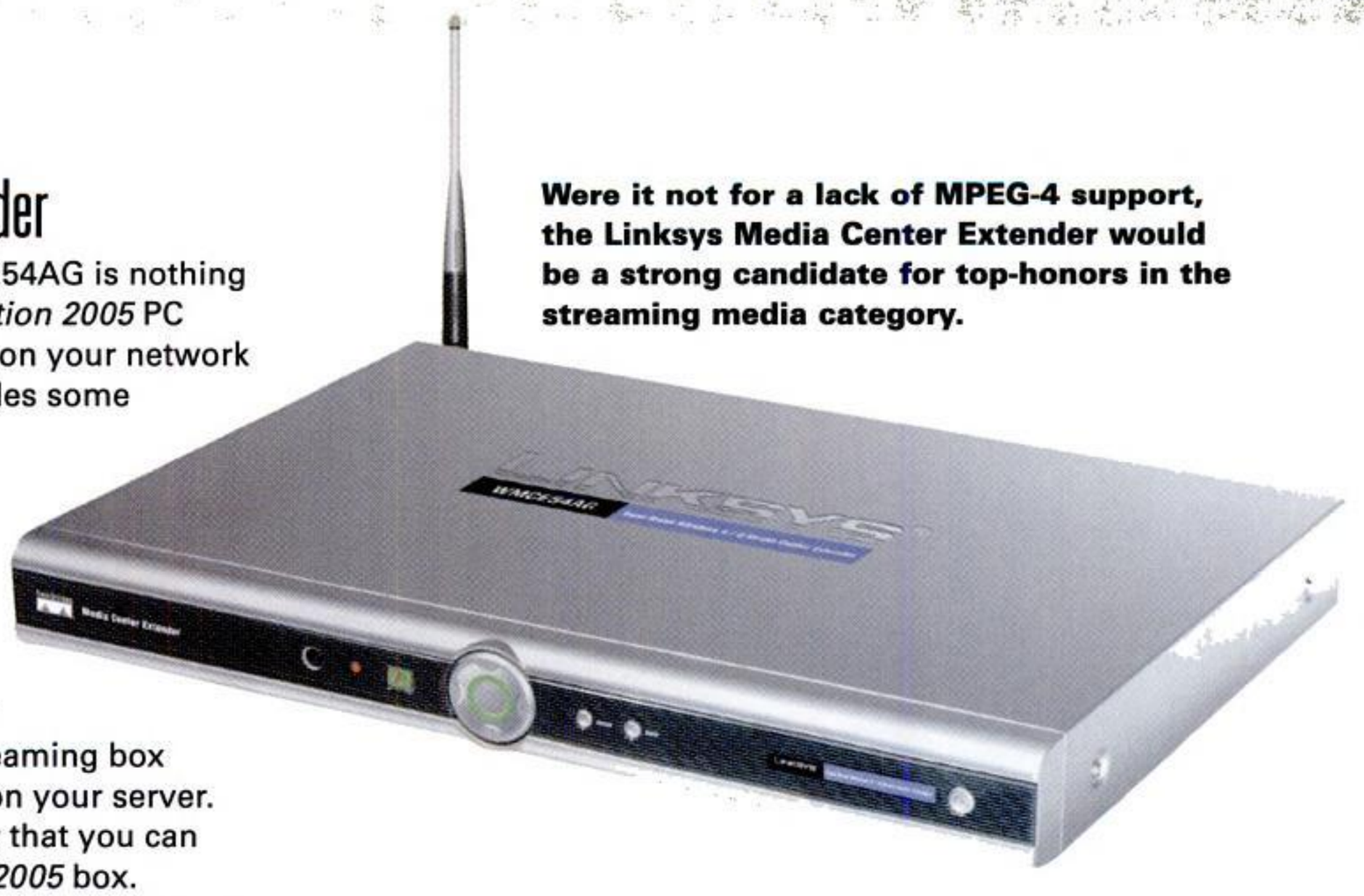
Linksys WMCE54AG Media Center Extender



Were it not for a lack of MPEG-4 support, the Linksys Media Center Extender would be a strong candidate for top-honors in the streaming media category.

Like all Media Center Extenders, Linksys' WMCE54AG is nothing more than a terminal for your *Media Center Edition 2005* PC (note that you must have an *MCE2005* machine on your network for an Extender to work). The WMCE54AG includes some kick-ass features, but also has some significant shortcomings, which makes it difficult to categorize.

MCE2005 users will feel immediately familiar with the Extender's interface, which is virtually identical to *MCE2005's*. And we can't imagine anyone not being impressed with WMCE54AG's ability to stream live TV over your wired or wireless network. It's the only streaming box we've ever tested that can take over a TV tuner on your server. That's pretty nifty, especially when you consider that you can connect up to five of these puppies to one *MCE2005* box.

The Extender's Achilles' heel is its format support. It streams only MPEG-2 and WMV formats; none of the other MPEG-4–based formats are supported. Folks who have encoded their movie collections using DivX or Xvid are plum outta luck, and utilities that encode commercial DVDs to the Windows Media format are nonexistent. Image quality is good for the videos the Extender *can* stream, but that can't begin to make up for piss-poor format support.

The only conceivable reason to buy the Extender over another non-MCE device is the ability to stream live TV.

MAXIMUM PC VERDICT 5

$250, www.linksys.com

PITFALLS—AND HOW TO AVOID THEM

Learning from other people's mistakes is a lot more fun than making your own

1. Multiple Measures

You can't easily rejoin a cable once you've cut it. Measure the distance for all your cable runs more than once. Add a few extra feet, and leave the excess cable coiled inside the attic or basement at the termination point. Even better, leave the cable connected to the spool at one end until you've completed the run.

2. Know What You're Dealing With

The walls and ceilings in older homes are built using lath and plaster instead of gypsum wallboard. Take care when drilling into or hammering this type of construction, lest you knock loose chunks of structure.

3. Keep It Cool

The species of wood used in some older homes is much denser than that used in newer construction. Our drill bit became so hot from the effort that it broke apart, leaving a large piece embedded in the floor. Lesson: Let your drill bit cool down periodically, and also consider buying a spare drill bit. Breaking your bit halfway through the project will ruin your day.

4. Reduce Cable Clutter

We find that it reduces clutter if we feed cable from the termination points back to the central switch location, as opposed to stuffing a bundle of cables up into the attic or down into the basement.

5. Avoid Bandwidth Constraint

Wi-Fi networks have their advantages, but bandwidth isn't one of them. A wireless network can carry only one video stream, so make sure you run Cat5e cable into any locations where you'll want to stream video.

6. Keep Your Distance

Don't run Cat5e cable alongside electrical cable. Phone lines are OK, but electrical circuits can interfere with data transmission. If you must cross an electrical cable, do so at a 90-degree angle.

7. Add More Ethernet Easily

If you need more Ethernet ports in an room that's already wired, you can add more by using an inexpensive switch. Just plug it in and go! ■

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MASSIVE DIGITAL MEDIA HOW-TO

FIGHT FOR YOUR FAIR-USE RIGHTS

Maximum PC shows you how to get the most out of your music and movies—whether the entertainment industry wants you to or not.

The entertainment industry thinks of them as the Four Horsemen of the Digital Apocalypse: the Internet, MP3 audio compression, Diamond Multimedia's Rio MP3 player, and Napster. By the time all four had become household names, we knew the revolution had begun. Anything that could be digitized could be duplicated, downloaded, distributed, and enjoyed in ways never before possible.

But revolution and chaos are like Europeans and Nutella: Where you find one, you're sure to find the other. The entertainment industrial complex, appalled by file sharing and terrified of the Internet, lobbied a gullible, greedy U.S. Congress into passing the Digital Millennium Copyright Act, a heinously overreaching law that tramples on consumer rights. Record labels, meanwhile, grudgingly permitted a few web sites to sell legitimate digital-audio tracks, but failed to develop universal compression standards and digital rights management (DRM) schemes, a uniform licensing policy, or even a consistent pricing model.

So now you can buy a DVD-Video, but it's illegal to decrypt the disc and create a DivX file that you can play back on your PDA. You can buy a song from *iTunes*, but the copy protection isn't compatible with your Rio Carbon player. Or you'll put an audio CD in your CD-ROM drive and watch helplessly as the copy protection crashes your system. *Good job, guys!*

In the midst of all this bedlam, control is conspicuously shifting back into the hands of an industry that still regards the Internet and digital distribution with a level of panic and horror befitting an Ebola breakout. Fortunately, there are ways to exercise your fair-use rights, whether the industry likes it or not. We're about to show you how to get around the technological blockades, so you can reap the humungous benefits of the digital-entertainment revolution.

Copyrighted material

HAVE A RIPPING TIME WITH YOUR DVDS!

Your laptop lacks an integrated optical drive, so you'd like to rip your DVDs onto its hard drive. You're bored in the jury box, so you'd like to watch a movie on your PDA or handheld video player. Your kids are too lazy to put DVDs back into their protective cases, so you'd rather they destroy backups of the discs instead of the originals. Each of these scenarios is an example of "fair use" as defined by U.S. copyright law.

The Digital Millennium Copyright Act of 1998 (DMCA) didn't revoke the concept of fair-use rights; but by summarily prohibiting the circumvention of copy protection, it made these rights nearly impossible to exercise. As a result, each of the fun-making activities described above is virtually impossible to do *legally*. And we think that's just ridiculous.

We're not out to vilify the entertainment industry, which encompasses thousands of record labels, movie studios, game publishers, and the artists who create the products the industry sells. They all have a serious and legitimate beef with intellectual-property pirates. As a magazine publisher, we're equally interested in protecting our *own* intellectual property rights. The fact is, music, movies, and games appear on the Internet with appalling speed after—and sometimes even before—their commercial release. And don't kid yourself that casual piracy—such as downloading a movie or a game without paying for it, and then justifying the act with the contention that you wouldn't have paid for it anyway—doesn't hurt anyone.

Pirates should also drop their whining claims that the entertainment industry makes more money than it's entitled to. Companies invest huge amounts of money in every title they release, and the rise of peer-to-peer piracy only discourages them from taking risks. Why should a publisher develop an innovative new game or movie that might lose money at retail, only to watch it become the latest, hottest download on BitTorrent? Wouldn't it be safer for them to push out *Doom 11*, *The Sims: Living Dead* expansion pack, or *Spider-Man 8*—properties that are reasonably sure to turn a profit?

The entertainment industry will sort out its issues with technology some day; until then, we'll need to perform work-arounds and use software that can be used for purposes both legal and illegal in order to exercise our fair-use rights.

Rip it to DivX

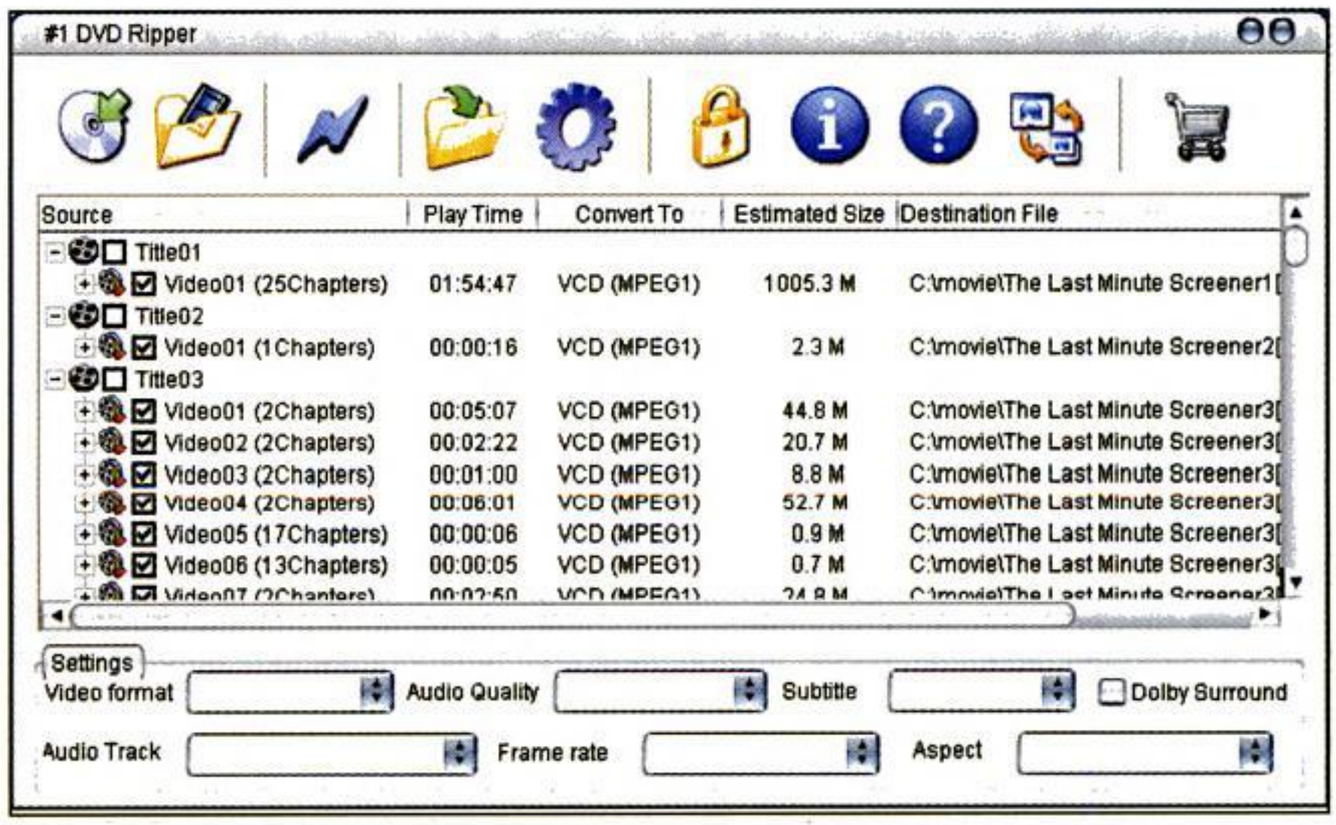
Let's start with commercial DVDs. In a perfect world, you could simply drag the contents of your DVD's VIDEO_TS folder onto your laptop's hard drive and play the movie with a software DVD player. The content scrambling system (CSS) used on most commercial DVDs, however, prevents you from doing that. But the cat got out of the bag in 1999, when an industrious lad named Jon Johansen cracked CSS so he could watch movies on his Linux PC. Once Johansen's simple code was distributed, there was no way—short of altering the DVD spec and rendering every DVD player obsolete—to shove the cat *back* into the bag.

Software that breaks CSS encryption is illegal under the DMCA, so you won't find it at Best Buy. But that hasn't stopped it from being sold by companies located in certain tropical countries lacking extradition treaties. Take Slysoft's *AnyDVD* ($40, www.slysoft.com), for instance. This program will decrypt a DVD on the fly just as if the CSS encryption wasn't there at all. DVD-video files can consume up to 8.5GB of your hard drive, however, and storage space on laptops and portable devices is notoriously scarce. Wouldn't it be so much better if an application not only ripped the contents of your DVD, but also compressed it into a single file for playback? That's just what *#1 DVD Ripper* does ($35, www.dvdtox.com), and we'll show you how easily it's done.

If you choose to buy this software, however, be aware that using it not only violates U.S. law, but also because it's sold by an "offshore" company, you're pretty much SOL if you buy the product and then decide you don't like it.

#1 DVD Ripper at Work

Before you begin, you'll need to download the codec (compressor/decompressor) you wish to use to compress your video. In this example, we'll use version 4.1.2 of the popular—and free—DivX codec. We use an older version of the codec because that's ▶



Selecting the proper chapter and title is easy if you know what you're looking for. The first thing to do is check the boxes for the chapters you wish to rip.

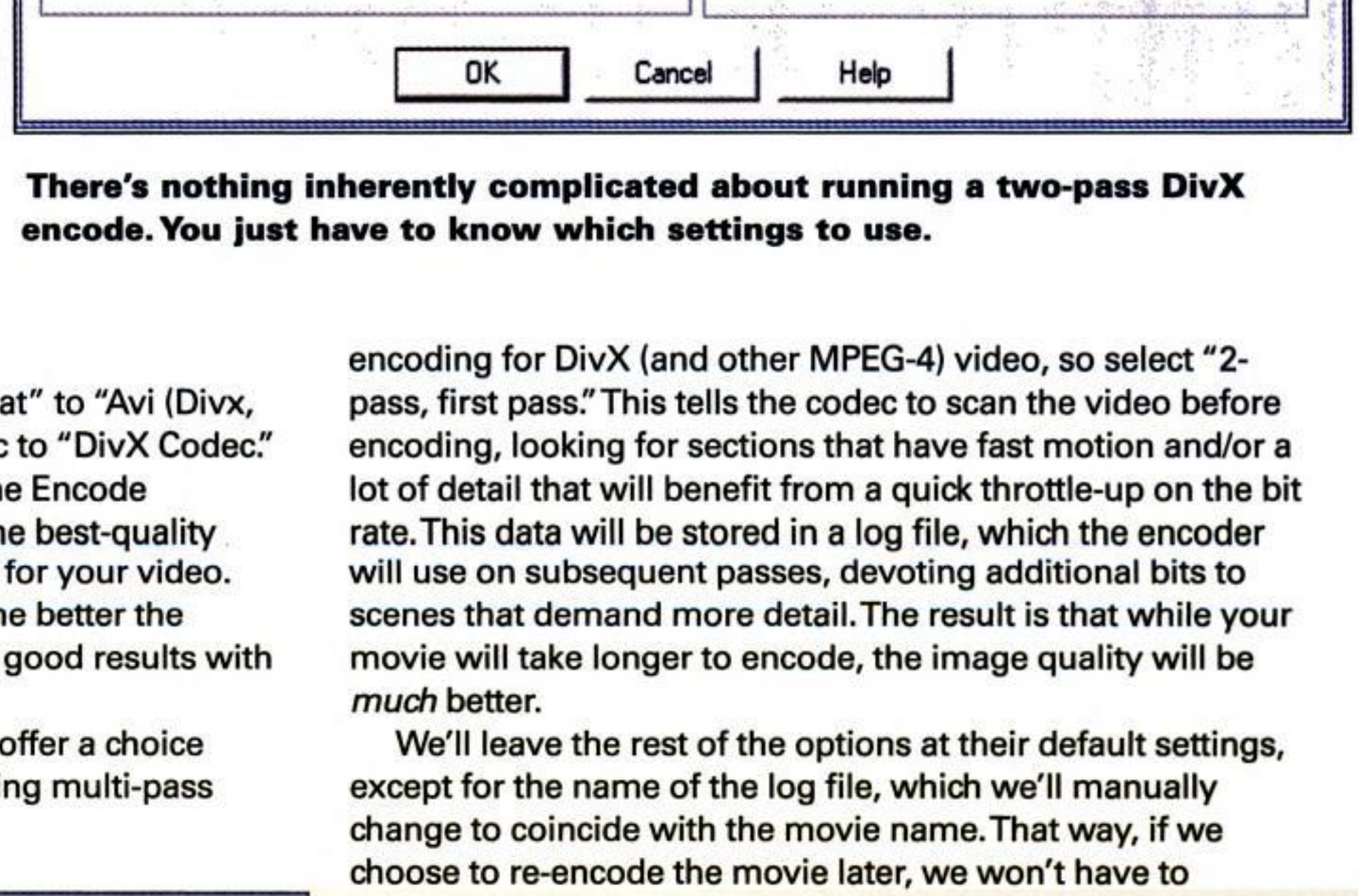
that's what the developer of *#1 DVD Ripper* recommends. Run the installation routines for both DivX and *#1 DVD Ripper* and you'll be ready to go.

Once you've launched *#1 DVD Ripper*, click the disc/arrow icon in the far-left side of the application to peek into the DVD's contents. DVDs often contain tons of material you might not want in your portable video, so the first thing to do is locate the main movie (frequently labeled "Title 01, Video 01"). The file you're looking for will be obvious because the play time equals the length of the film. (Note: To avoid running afoul of U.S. law, we used a film that does *not* use CSS encryption.) Uncheck everything else. (If you click on the + sign, you can select individual chapters and rip selected scenes from the movie.)

The next step is to configure the settings for your codec, (Initiates can take comfort in knowing this needs to be done only once; power users can go crazy experimenting with the settings.) Click the gear icon and switch to the Output tab. Change the "Default output video format" to "Avi (Divx, MPEG-4)," and then change the Video Codec to "DivX Codec."

Click the Configure button and change the Encode Performance setting to "Slow" to achieve the best-quality encoding. Now it's time to choose a bit rate for your video. Just as with MP3s, the higher the bit rate, the better the quality and the larger the file size. You'll get good results with a 900Kbps bit rate.

The "Encode mode" drop-down list will offer a choice of settings, but we strongly recommend using multi-pass encoding for DivX (and other MPEG-4) video, so select "2-pass, first pass." This tells the codec to scan the video before encoding, looking for sections that have fast motion and/or a lot of detail that will benefit from a quick throttle-up on the bit rate. This data will be stored in a log file, which the encoder will use on subsequent passes, devoting additional bits to scenes that demand more detail. The result is that while your movie will take longer to encode, the image quality will be *much* better.

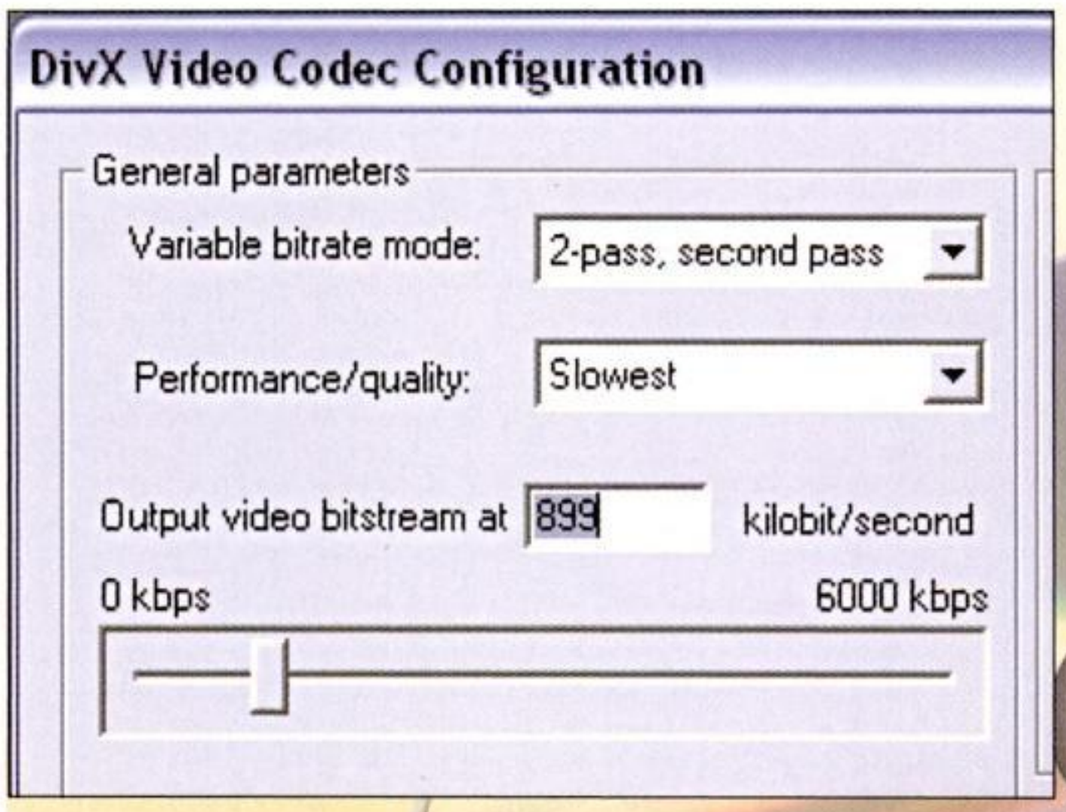


There's nothing inherently complicated about running a two-pass DivX encode. You just have to know which settings to use.

We'll leave the rest of the options at their default settings, except for the name of the log file, which we'll manually change to coincide with the movie name. That way, if we choose to re-encode the movie later, we won't have to rerun the first pass. If you feel like pulling a Little Red Riding Hood by exploring the scary menus, you'll see a staggering number of options, each of which is more cryptic than the last. Explaining all these options is beyond the scope of this article, but we have provided a list of resources on page 83 for those of you who might want to delve deeper. For now, click OK and trot back to the main screen.

Now we're ready to rip the movie. Press the lightning-bolt icon and get ready to wait. It will take a few hours to do the first pass. No one seems to know why, but some sessions will produce an "AVIStreamSetFormat failed" error message. If this happens to you, go back to the DivX configuration panel and select one-pass encoding (use the Bitrate Calculator button to select the ideal bit rate) to get around the problem.

Once that's finished, you need to change the codec options for the second pass. Go back into the Settings panel and click the Output tab. Press Configure and change Variable bitrate mode to "2-pass, second pass." Press OK, then click the Size/Bitrate tab. Make sure you select the proper bitrate for audio—we like 192Kbps for the best balance of sound ▶



Setting up the second encoding pass is as simple as changing a single option.

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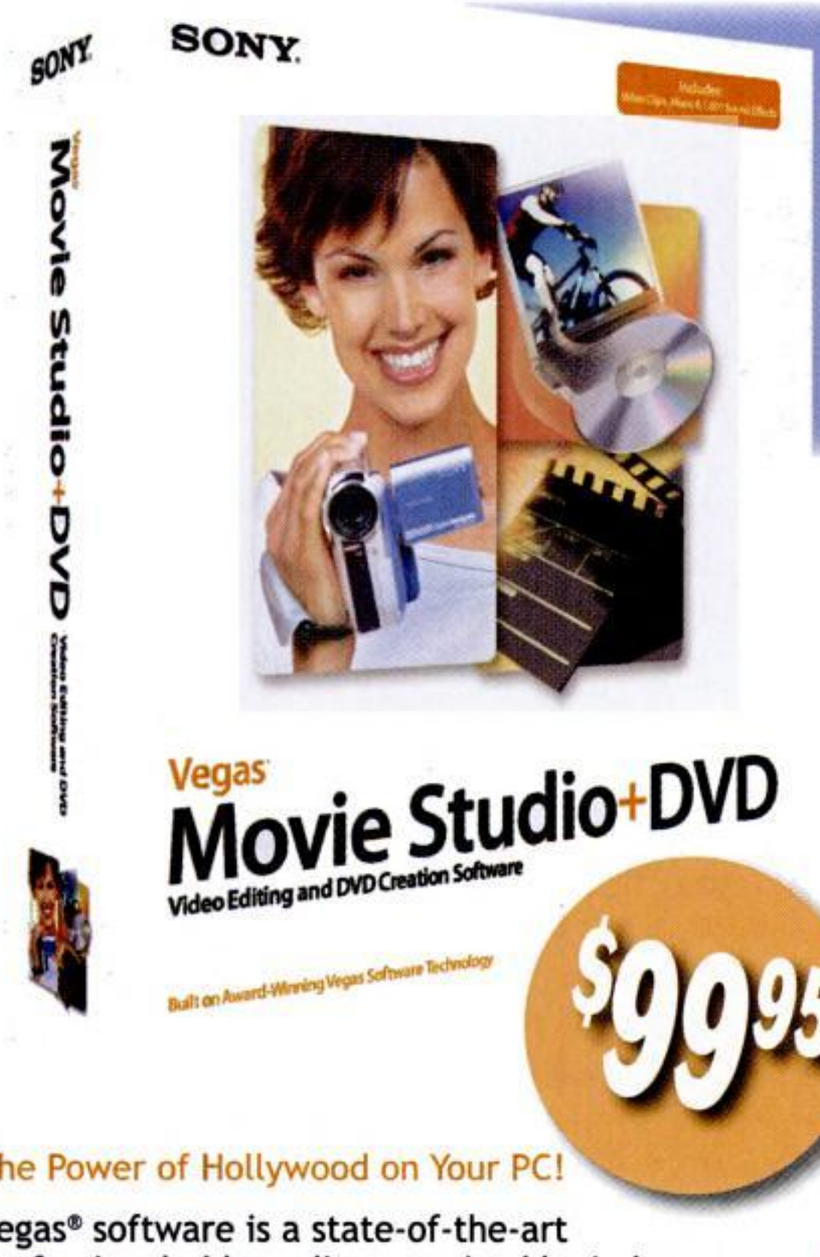
The professional versions of Sound Forge®, ACID® and Vegas® software have been synonymous with professional media creation and productivity for over a decade. Now, Sony proudly introduces three new affordable applications built on the same award-winning programs. It's never been easier to create and edit music and movies on your PC!

Like the professional applications from Sony, these products are powerful, easy to use, and loaded with features & extras. And they are designed to work perfectly together, so media created in one application can easily be imported into projects created with the others.

The novice user will appreciate the interactive tutorials in Vegas Movie Studio and ACID Music Studio software-- just click "Show Me How" for help at any time. Each of these new applications shares a common interface with its professional counterpart, so moving to the next level of media production is practically seamless!



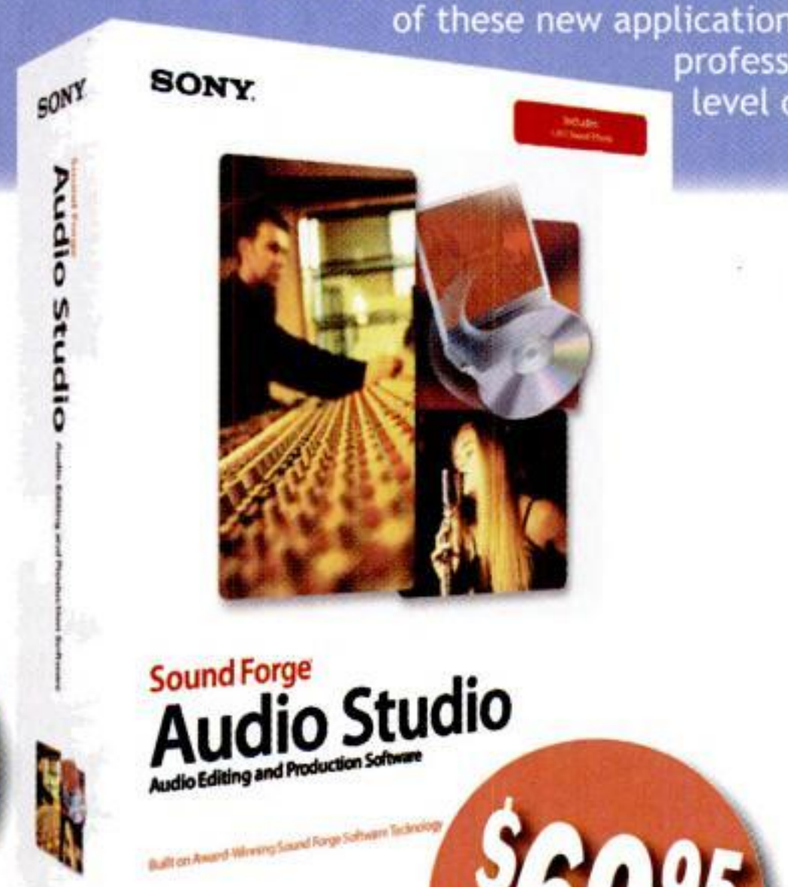
The Power of Hollywood on Your PC!

Vegas® software is a state-of-the-art professional video editor — prized by industry pros worldwide for its power, reliability, and ease of use. Now, Sony Media Software introduces Vegas Movie Studio™+DVD software — a streamlined version of the professional program. It's the perfect entry-level tool for video-editing and DVD-creation on your PC.

Make Movies, Slideshows, Presentations & more

Vegas Movie Studio+DVD software is a powerful, easy-to-use video editor. Just plug your camcorder or digital camera into your PC to capture your media. Then, arrange your video clips or pictures on the timeline and add effects, transitions, titles, and music for Hollywood-style results. You can use Vegas Movie Studio+DVD software to:

- Create entertaining home movies to commemorate weddings & special events
- Zoom, rotate, and pan across photos to create dynamic slideshows
- Make your own DVDs complete with multiple menus, buttons, and links
- Create exciting, professional-looking presentations

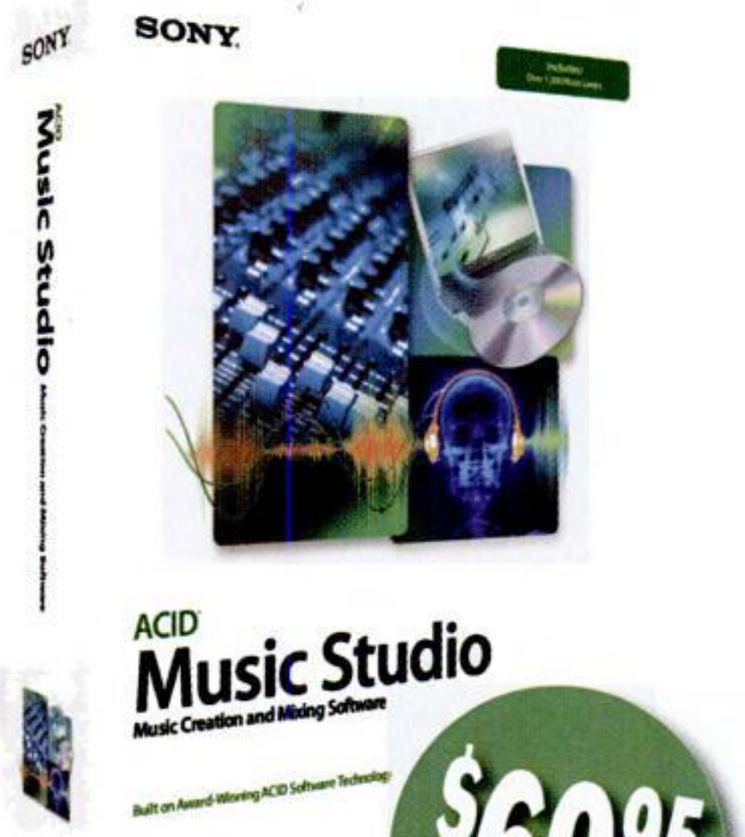


Includes 1,001 Sound Effects!

Sound Forge® software is the professional's choice for audio editing, recording, effects processing, streaming content creation & more. Now, Sony introduces Sound Forge Audio Studio™ software — an easy-to-use home version of the professional program. If you want to record music, edit & restore audio, create streaming media & burn songs to CD, Sound Forge Audio Studio software is all you need.

Turn Your PC into a Recording Studio

Sound Forge Audio Studio software makes it easy to record audio on your PC. Just plug a microphone or instrument into your computer's sound card, set your recording levels, and click Record. Capture instruments, vocals, keyboards, or just about anything that can be connected to your computer's sound card. Edit your recording using studio-quality tools and effects. Cut, paste, and delete audio in real-time so you hear the results immediately!



Over 1,000 Music Loops!

ACID® Pro software is the industry standard for pro music creation on the PC. Built on the same technology, ACID Music Studio™ software provides the power, flexibility, and reliability of ACID Pro software, with a streamlined set of features that makes it perfect for home music creation and mixing.

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It's easy to create songs instantly from prerecorded audio samples called loops. Just pick some loops, paint them into the tracks, and click Play. To record your own tracks, just plug a mic or instrument into your computer and click Record. If you want to make your own music or remixes, add soundtracks to videos, or burn your own songs to CD, ACID Music Studio software is all you need.

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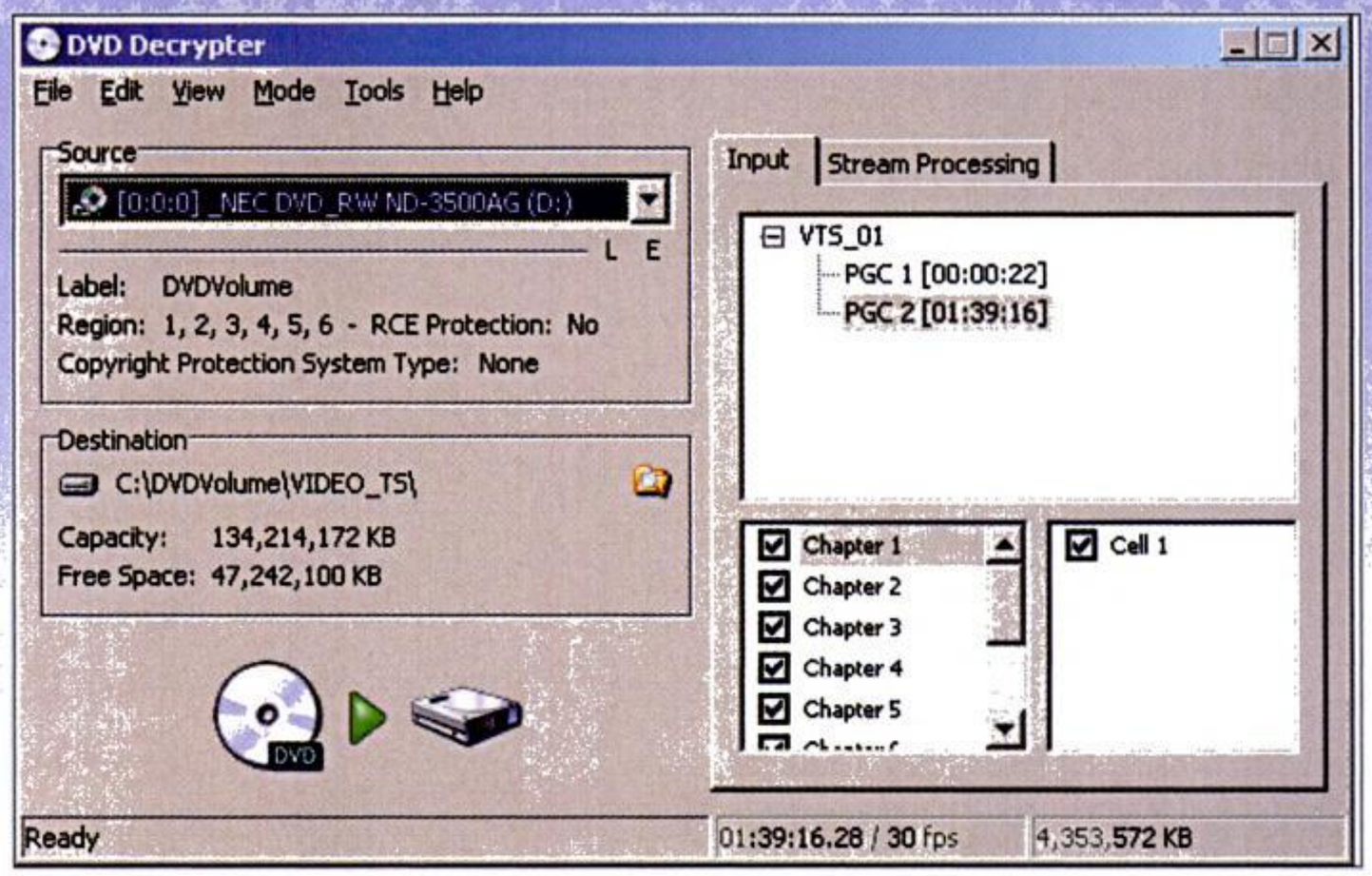
quality and size. Press OK again, and then press the OK button on the next screen as well. In a few hours you'll have a DivX version of your movie!

More Fun with DVD Ripping

You'll find oodles of methods for converting DVDs to compressed MPEG-4 video, including this method that's particularly well suited to creating files that are playable on your Pocket PC or portable video player—and it doesn't cost a cent (woo-hoo!). You'll need two applications: *DVD Decrypter* (**www.dvddecrypter.com**) and *AutoGK* (**www.autogk.com**). Install both applications (*AutoGK* actually installs a bundle of freeware apps and runs them as if they were a single application).

Drop your DVD into your optical drive and launch *DVD Decrypter*. From the menus, select Mode > IFO, which will produce files in a format we'll need later. Now go to the Edit menu and select "Select Main Movie PGC," which will automatically select the main movie for you. *DVD Decrypter* will create a default destination directory, but you can change it by clicking the folder under Destination. Next, click the rip icon and kick back—this could take a while. You'll hear a cheery tune when the software's done.



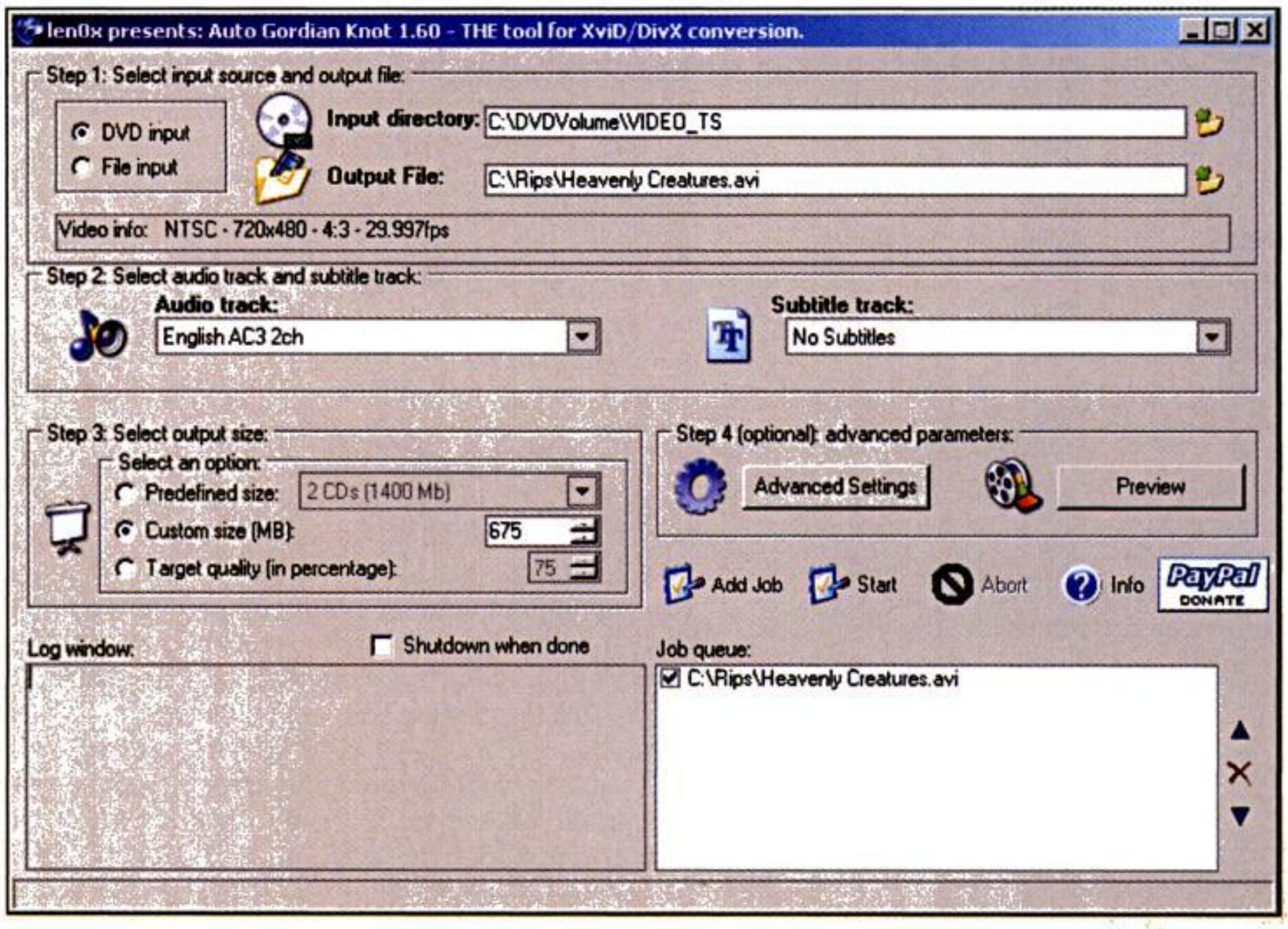
It's pretty obvious that the highlighted file is the main movie stream. The other file is probably an irritating info screen.

The next step is to convert the results from the DVD-Video format to a single AVI file. *AutoGK* not only does this, but it also takes the guesswork out of creating video that's constrained to a specific size (for burning to multiple CDs, as opposed to a single DVD, for example) or a specific resolution (for exporting to a Pocket PC). Fire up *AutoGK* and click the folder next to Input Directory. Navigate to the VIDEO_TS folder that *DVD Decrypter* dumped its files into and click OK. Specify a location for your AVI under Output File (*duh*).

If you're creating video for playback on a PC or a laptop, move your mouse to the box labeled "Step 3: Select output size" and select either "Predefined size," "Custom size," or "Target quality." Obviously, the smaller the file size, the lower the resulting quality.

If you're creating video for playback on a Pocket PC or a portable video player, select "Custom Size" and tell *AutoGK* how big you want your file to be (based on your available storage). Click the Advance Settings button in the Step 4 box. Under the heading "Resolution settings," click the "Fixed width" radio button. Here's where you indicate the maximum width—in pixels—your portable device can handle. If you have a fancy-ass VGA Pocket PC, for example, enter 640 in the box next to the button. Click OK, click the Add Job button, and then click Start.

We guarantee the conversion process will take longer than you anticipated, so if you haven't finished reading *The Da Vinci Code*, now's a good time. When you reach the end and find out the butler was responsible for everything, you'll have an AVI file that can go wherever you do. ►



We've selected a custom file size of 675MB for decent playback quality on our laptop.

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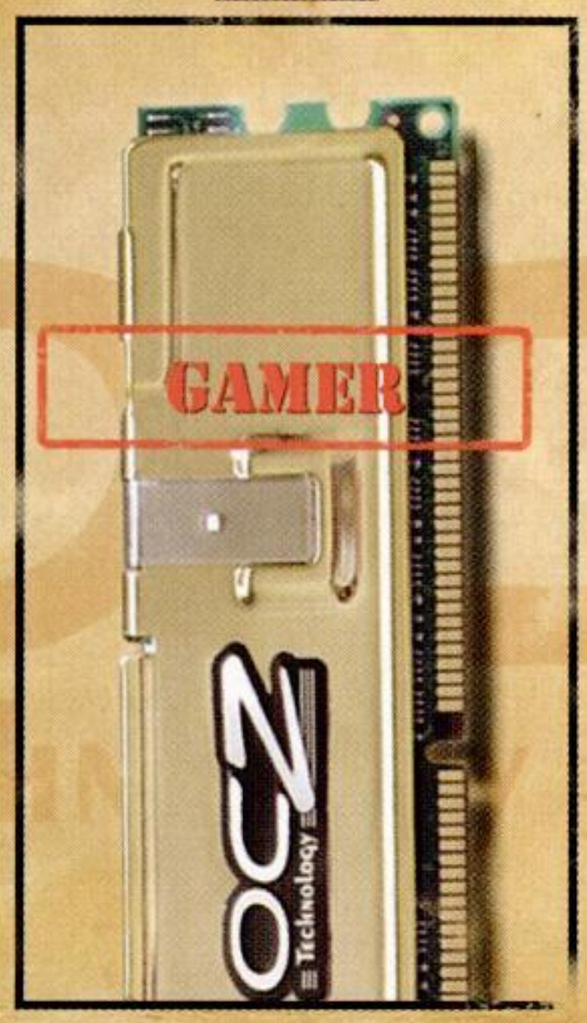

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Unauthorized, extreme gaming conditions, contributing to gamers' wicked behavior of unstoppable fragging day and night.

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RIP EVEN THE MOST RELUCTANT AUDIO CDS!

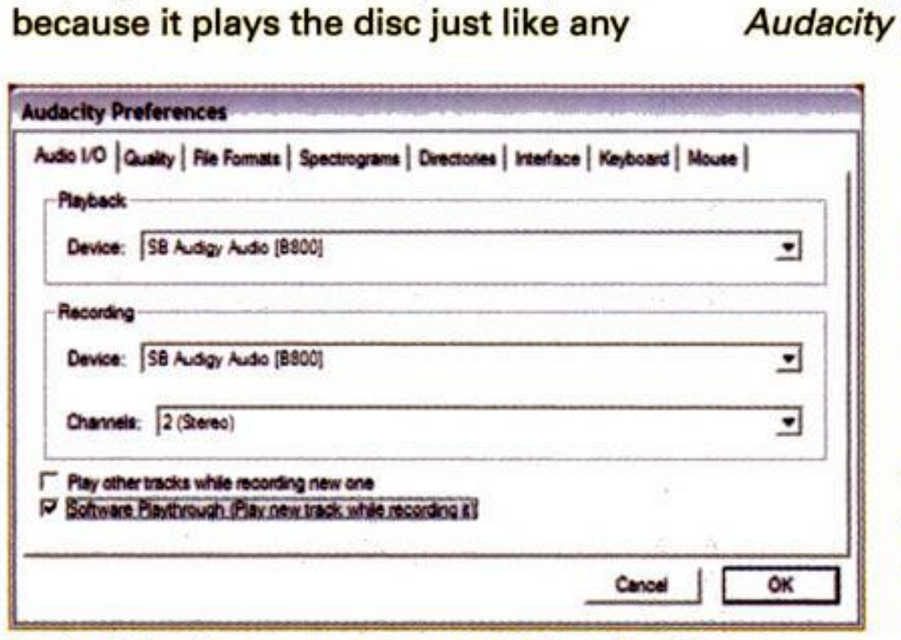
The history of audio-CD copy protection is sadder than the sight of a 60-year-old cocktail waitress squeezed into a poly-blend halter top. Celine Dion's *A New Day Has Come* uses Sony's Key2Audio protection, which has been known to crash many PCs. A quick Google search reveals a method of defeating Key2Audio with—get this—a Sharpie. Velvet Revolver's *Contraband* uses protection software from SunnComm, a company that once threatened to sue a Princeton graduate student under the Digital Millennium Copyright Act (DMCA) for revealing that the disc's copy protection could be defeated simply by holding down the Shift key after dropping the disc into the computer's optical drive.

But the latest scheme designed to prevent ripping audio CDs to your hard drive just might be the worst. Macrovision's SafeAudio technology is a misnomer: this copy protection actually works by *damaging* the audio signal. Audio CDs use an error-correction algorithm called Reed-Solomon, which tolerates minor disc errors (such as those resulting from scratches) by "guessing" at the missing data. The technique is effective, but if the algorithm has to guess too many times consecutively, it will introduce distortion and even skips.

Here's how the damage occurs: Macrovision's SafeAudio works by deliberately injecting extremely brief bursts of noise into the data stream. This isn't a major issue when you're playing an audio CD on your PC, because it plays the disc just like any old boom box—it uses Reed-Solomon error-correction. The digital audio-extraction process, however, chokes on this sudden burst of tear gas.

But none of these protections—not even SafeAudio's heavy-handed approach—prevent you from grabbing the audio stream after your soundcard has converted it back into analog waveforms to be sent to your speakers. We'll show you how to do it, and what steps you should take to get the best-quality results. It's time-consuming, and may look complicated at first, but it's really a breeze after the first time. And here's a thrilling bonus: If you have a DVD-ROM drive, this method will also allow you to make an MP3 of the audio from a DVD-Video, so you can listen to *The Big Lebowski* during your morning commute.

And it's all perfectly legal and ethical—provided, of course, you currently own a legitimate copy of the disc.



***Audacity* allows you to record audio from even copy-protected CDs using the analog signal from your soundcard.**

One Way or Another, We're Going to Get That Music

1 First, download and install the fantastic open-source audio editor *Audacity* from **http://audacity.sourceforge.net/**. Then hop over to **http://mitiok.cjb.net/** and grab the free LAME MP3 encoder as well.

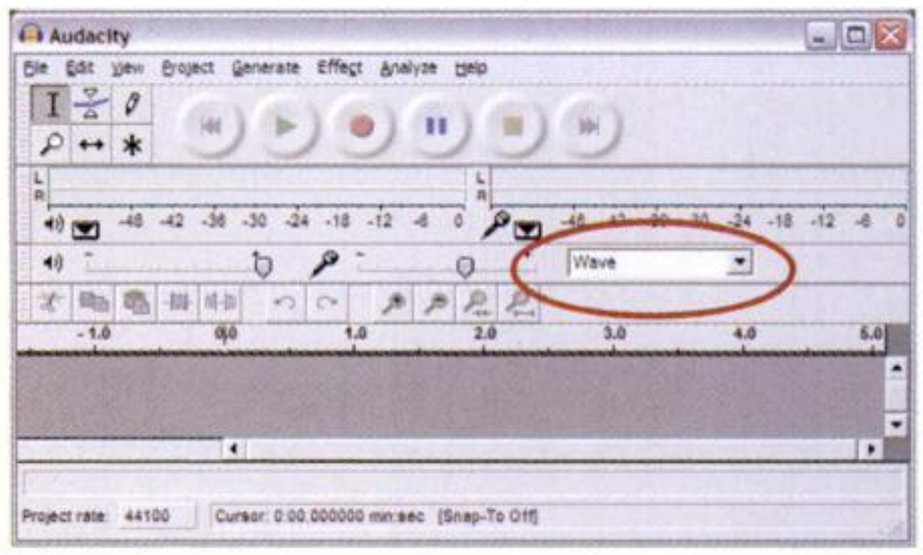
2 Install *Audacity*. Extract the contents of the LAME encoder zip folder you downloaded to a temporary directory. Locate the lame_enc.dll file and move it to the directory in which you installed *Audacity* (this DLL is the only file you'll need from the LAME package, so you can trash the temp folder).

3 Launch *Audacity*. Before you begin recording, you need to do some basic configuration tweaks. Go to File > Preferences and click the Audio I/O tab. This is where you tell *Audacity* which hardware to use for playback and recording. We're using our Sound Blaster soundcard to record and play back audio, so we've selected SB Audigy Audio from the drop-down lists under Playback and Recording. From the Channels drop-down list, select 2 (Stereo).

4 Now, click on the File Formats tab. Under MP3 Export Setup, click the Find Library button. Click Yes on the dialog box asking you to locate the LAME encoder, navigate to the *Audacity* directory, select the lame_enc.dll file, and then click Open. Use the Bit Rate drop-down menu to select your bit rate. We recommend selecting a bit rate of at least 192Kbps for music; if you're ripping audio from a DVD that's mostly conversation, you can get away with as little as 64Kbps. Click OK to finish the configuration process.

5 Now we're back in the main application window. Access the drop-down menu circled in the screenshot and select Wave from the list. This tells *Audacity* that you want to record the audio to an uncompressed WAV file.

6 Now it's time for a test run. Insert the CD you want to record into your optical drive and launch your media player. If you're already familiar with the contents of the disc, skip ahead to the loudest portion of the CD—this will help you adjust the recording level to minimize distortion (do the same for the loudest portion of the DVD, if that's what you're up to). While the song is playing, click the red Record button at the top of the window (it looks grayed-out, but that's just a poor design decision). You should now see red bars indicating that a signal is being recorded. Watch the bars as the track plays, and adjust the input volume



Select "Wave" to record to an uncompressed WAV file—but be aware that these files are gigantic.

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slider (next to the microphone icon beneath the meter) until the red bars approach the far-right edge of the meter ("0") but do not touch it. If the peak level is too high, you'll get distortion. If it's too low, you'll get hiss.

7 If you're not getting a signal, go to the Sound control panel (Start > Control Panel > Sounds and Audio Devices). In the Device Volume panel, click Advanced. You'll see the volume adjustment control panel, where you'll want to make sure the Wave volume slider is at least three-quarters of the way up and not muted. If you can hear the CD playback through your speakers but still aren't getting any signal, go back to the *Audacity* drop-down menu from step 3 and look for an option to record the signal sent directly to the speakers; if you have a Sound Blaster soundcard, that option will be labeled "What U Hear." Be aware that this setting will also record any system sounds (such as mouse clicks), so don't use your PC during the recording process.

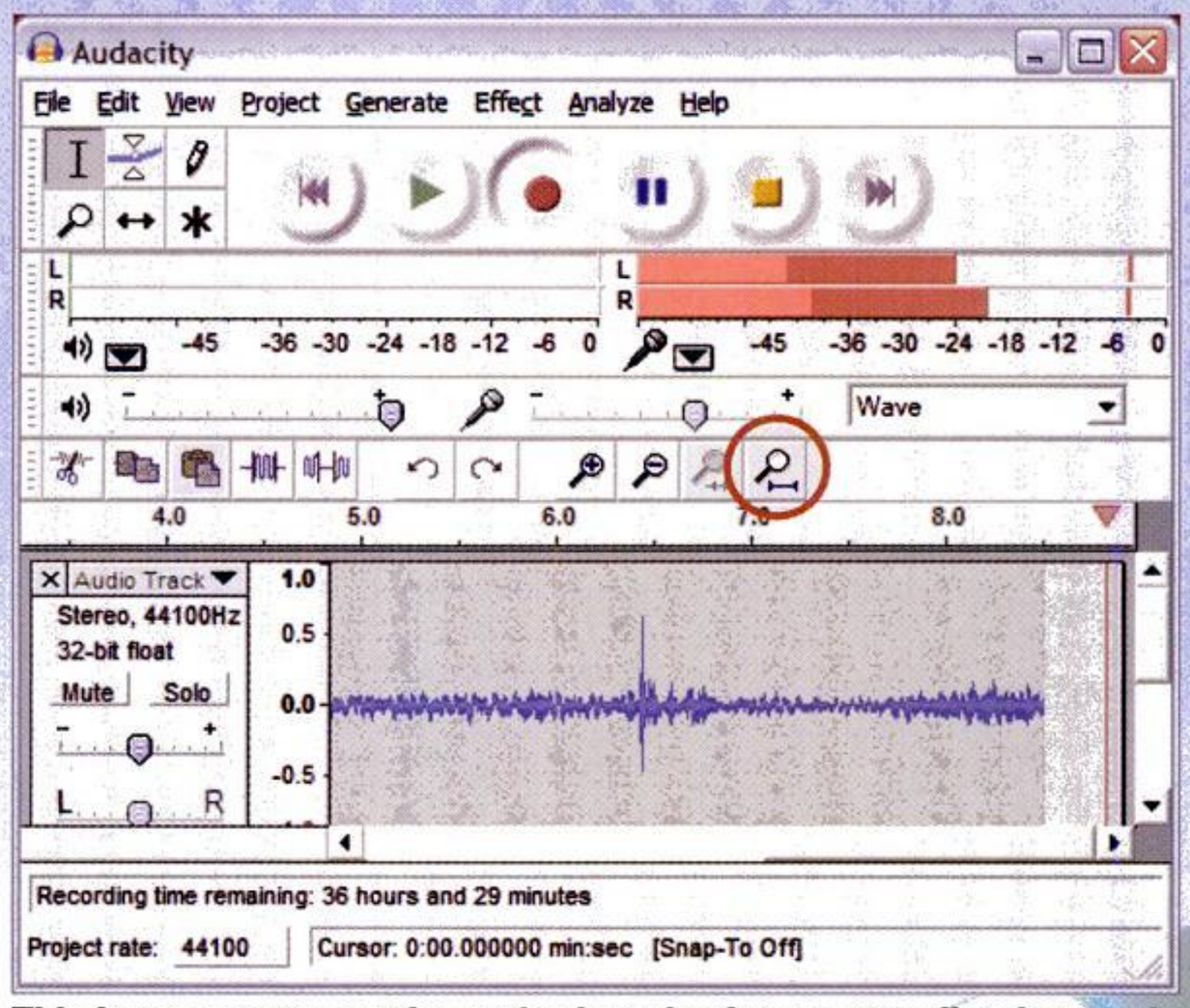
8 Finally, close all applications running in the background, especially those that frequently access the hard drive (that means no file-sharing funny business in the background while recording, OK?).

9 Restart the CD, hit the record button, kick back, and let *Audacity* do its thing. Press the square yellow stop button when the disc is finished.

10 Now it's time to split the single, continuous MP3 file into individual tracks (or chapters, for DVD recordings). First, go to File > Export as WAV, and save the track to whatever directory you prefer. You do *not* want to export the recording to MP3 yet, because you'll end up clipping out portions and having to export them to MP3 again. This will recompress the files and degrade the signal quality.

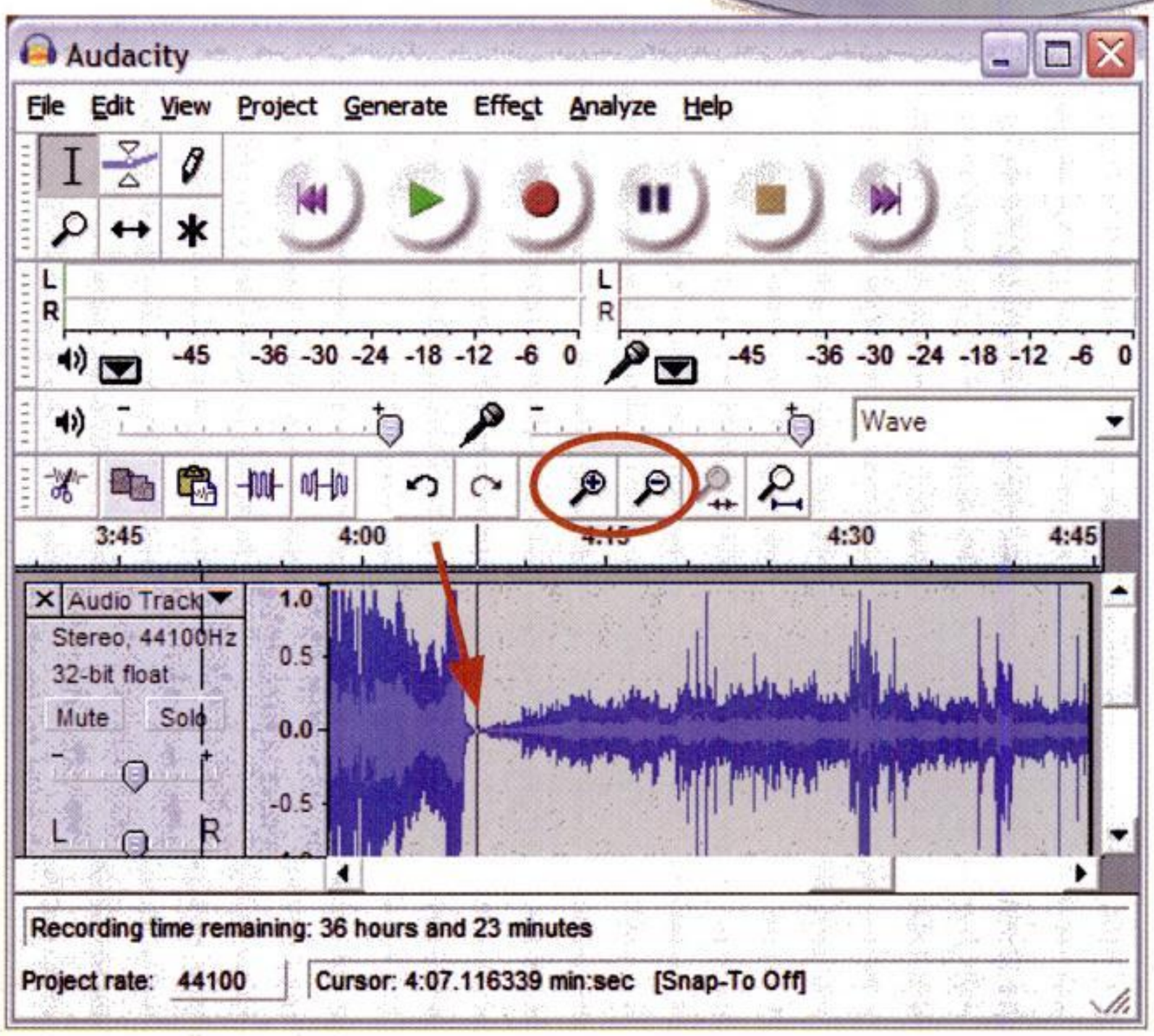
11 Click the Fit Project in Window button (circled above). This will place the visual representation of your entire recorded track in the track window. To find the space between tracks, simply scan the track window for areas with little or no signal.

12 When your mouse is in the track window, it turns into an I-beam cursor. Use this cursor to select the portion of the track you want to make a single file of (the easiest method is to place the cursor at the *end* point of your selection, and drag left to the beginning of the file). Select Edit > Cut (or press Ctrl-X) to snip out this portion. Go to File > New, and a new *Audacity* window will open. In the new window, select Edit > Paste (or Ctrl-V).



This button squeezes the entire length of your recording into a single window so you can quickly scan for silence between tracks.

13 Now that we've got the track ready for conversion, simply go to File > Export as MP3. Tell *Audacity* where you want to drop the MP3 and click Save. Next, you'll be offered the opportunity to add ID3 tags. When you click OK, the file will be converted to MP3. Repeat this process for the rest of your tracks. ▶



By using the magnify tool, we can zoom into the track to place our cursor at the end of a track.

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PLAY YOUR PURCHASED MUSIC ON ANYTHING

The entertainment industry might recall Napster's heyday with a collective cringe, but the rest of us remember the thrill of grazing in endless pastures of music, and downloading MP3s that played on whatever device we fancied.

Not anymore. Apple's iPod is the only device that supports FairPlay, the proprietary digital-rights management (DRM) scheme employed by Apple's iTunes music store. So if you purchase music from iTunes, you won't be able to play it on any other MP3 player. And if you *do* own an iPod, don't bother shopping at the now-legit Napster, because the iPod doesn't support the DRM scheme that's present in Windows Media Audio files. To make matters worse, there's music that's exclusive to one site or another, and there's *no* digital-audio player that can play music from them all.

Of course, DRM schemes are doomed to be broken. Apple turned a little sour when the *Playfair* utility came to market. *Playfair* converted protected iTunes tracks with the M4P extension into ordinary AAC files, which could be played on any player that supports AAC format. In response, the iTunes DRM was quickly updated to foil *Playfair*. This development led to *Hymn*, yet another DRM "unwrapper." And so on.

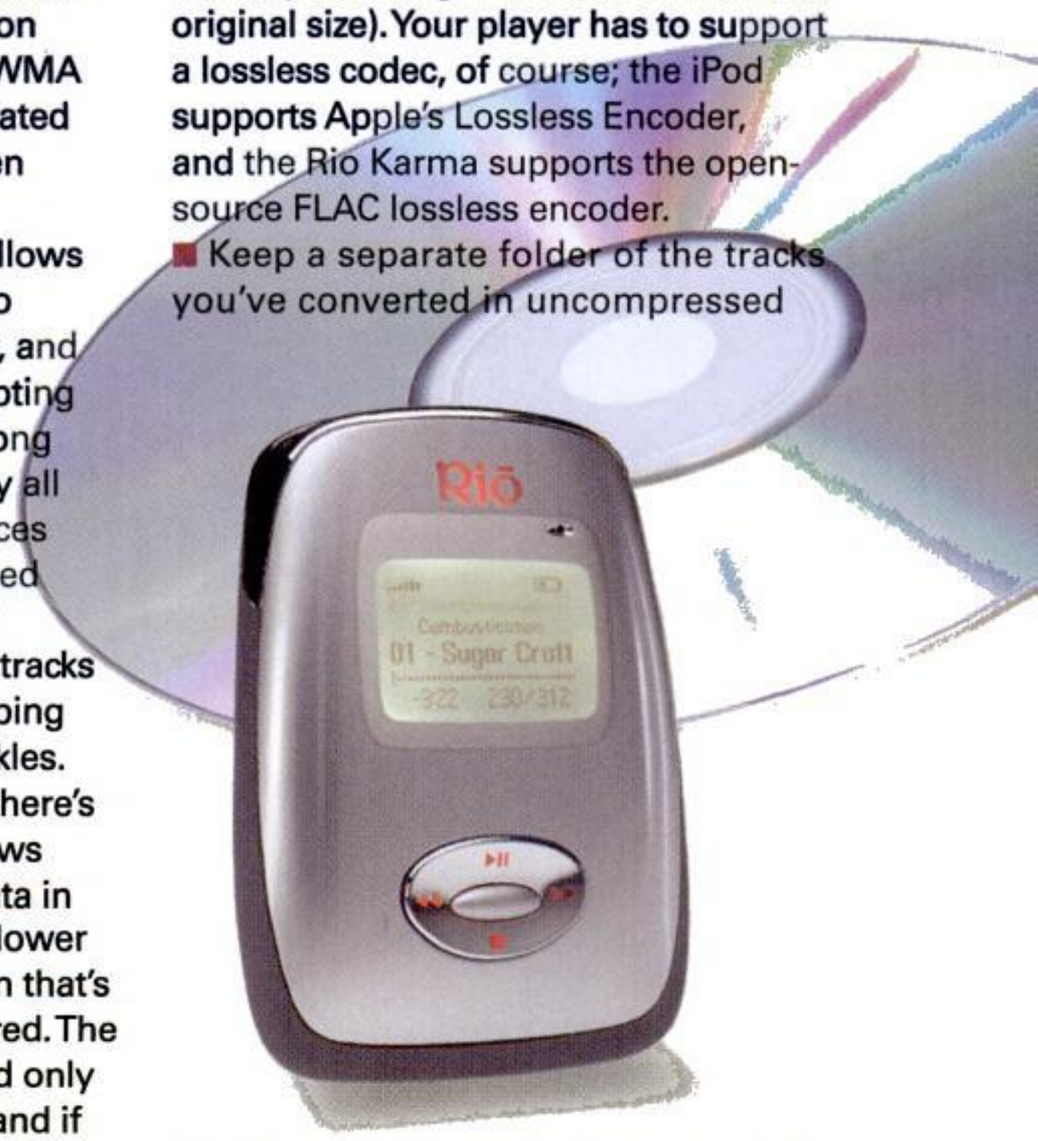
Microsoft's own DRM has proven surprisingly sturdy. After a utility called *unf**k.exe* (this is a family magazine, so figure out the missing letters on your own) was released to strip WMA files of their DRM, Microsoft updated its methods, and they hadn't been cracked at press time.

There *is* a work-around that allows you to convert protected tracks to unprotected tracks in any format, and because it doesn't involve decrypting the tracks, it's perfectly legal as long as you don't share them. Virtually all online music-downloading services permit you to burn your purchased tracks to CD a limited number of times. Once you've done so, the tracks can then be extracted by any ripping program, free of their DRM shackles.

But—wouldn't you know it—there's a catch. Audio compression throws out a certain amount of audio data in order to reduce the file size: The lower the bit rate, the more information that's thrown out—never to be recovered. The audio CD you produce will sound only as good as the source material; and if you recompress the tracks, you'll lose even more data, degrading the audio quality even further.

Here are our tips for getting the best quality from the download-burn-and-rip routine:

- If you *must* recompress your tracks, do so at the highest bit rate possible. Of course, high bit rates mean larger files, so you'll need to strike a balance between audio quality and the number of tracks you want to store on your player.
- If you want the absolute best audio quality, encode files using a lossless codec that compresses audio without discarding *any* audio information (usually resulting in a file about half the original size). Your player has to support a lossless codec, of course; the iPod supports Apple's Lossless Encoder, and the Rio Karma supports the open-source FLAC lossless encoder.
- Keep a separate folder of the tracks you've converted in uncompressed WAV format. This way, if you want to recompress the files using a different codec later, you won't have to waste another one of your burn privileges. ▶



What's PlaysForSure?

The next time you go shopping for an MP3 player, you can expect to get a whiff of assurance from boxes stamped with the PlaysForSure logo. But what exactly does this logo tell you?

The presence of "Windows Media" says it all. The PlaysForSure logo is simply Microsoft's guarantee that any MP3 player that bears this badge will play any track purchased from an online music-downloading service that brandishes the same logo.

By associating MP3 players and music stores that support Windows Media Audio DRM as a family of compatible products, Microsoft intends to challenge the phenomenal success of Apple's iPod/iTunes combo (and you know that success must be driving Microsoft absolutely *nuts*).

See this logo? Any MP3 player that has it won't play your iTunes tracks, so shop carefully.

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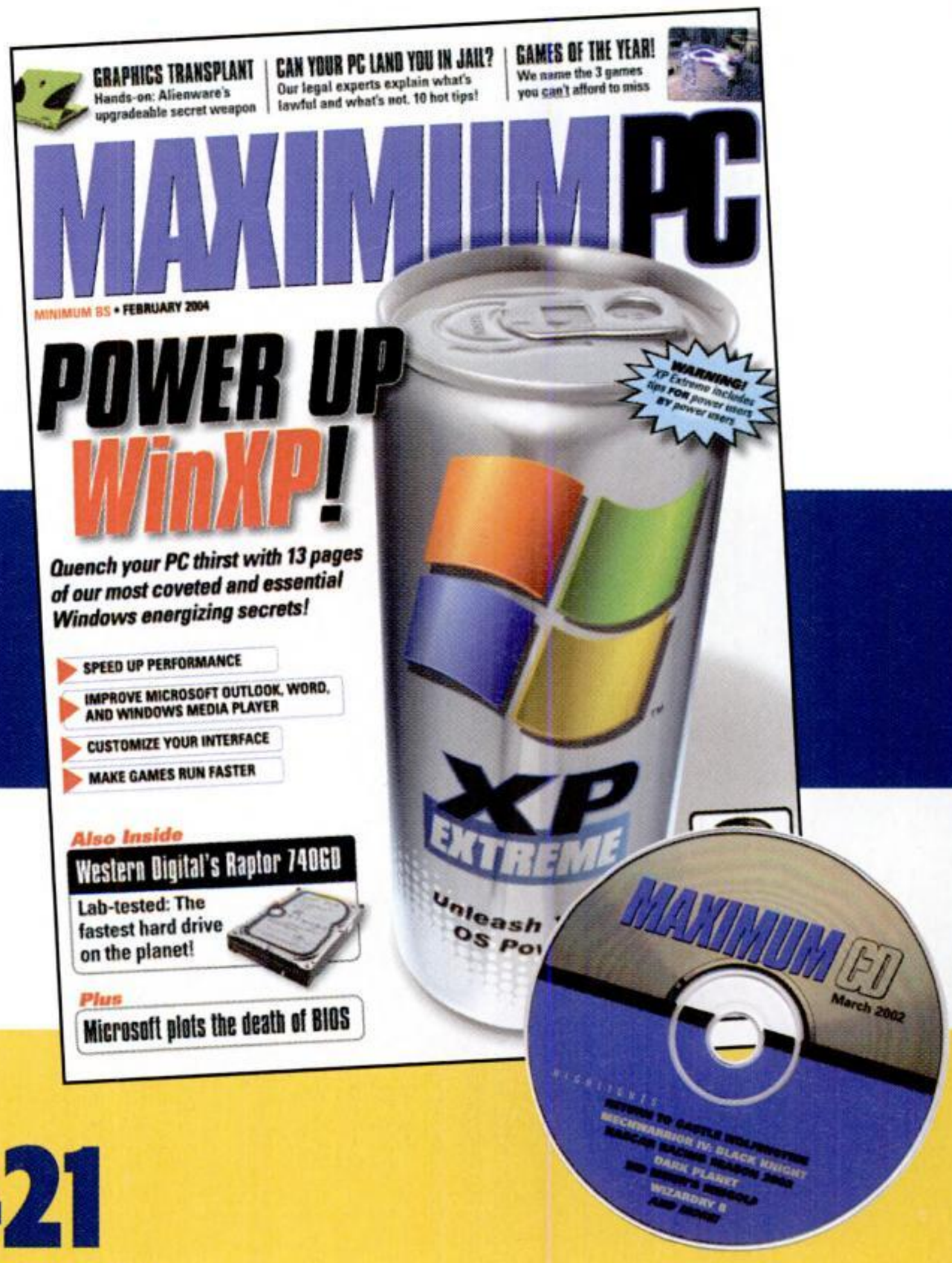

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ENJOY THE INTERNET CINEPLEX!

We've all been there. You've excitedly downloaded an unknown video referred to as "OMG—teh funniest video evar!" from a message board, only to discover that the video won't play. Maybe you can hear it, but there's no video; or maybe it just won't play at all. As connoisseurs of quality Internet video ourselves, we understand how frustrating this situation can be. We're here to make sure it never happens to you.

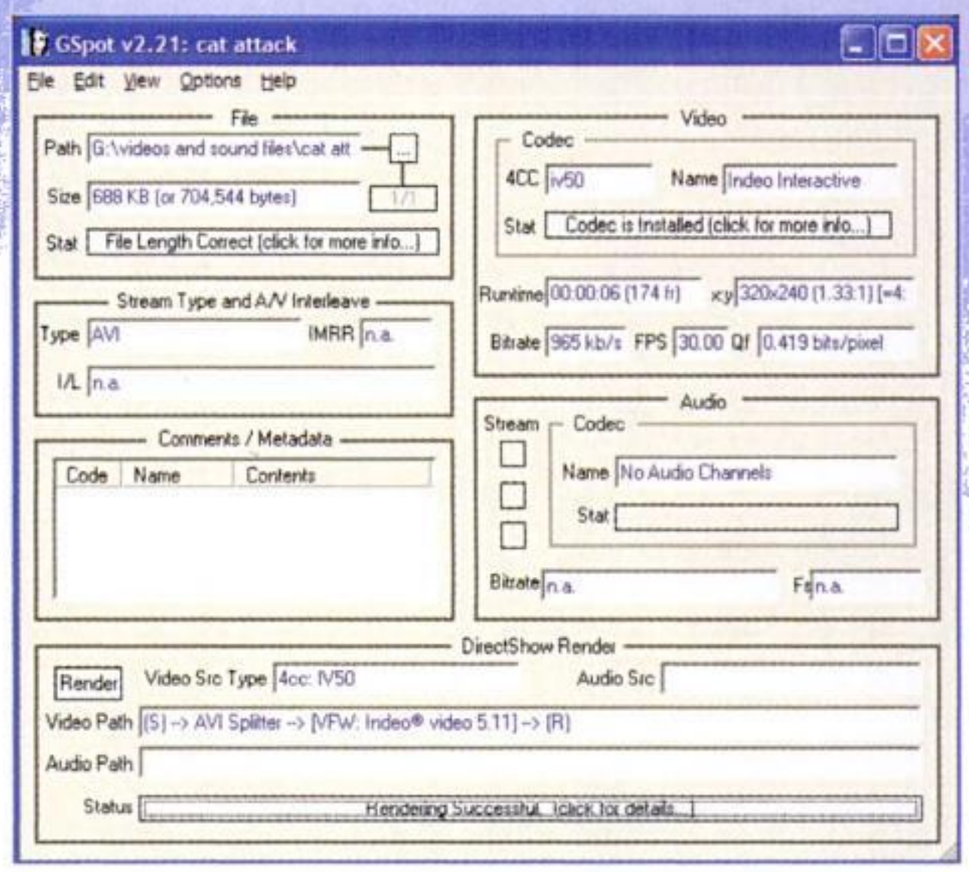
Tools of the File Trade

That clip you downloaded of some skateboarding dumbass's spectacular encounter with pavement has had its contents compressed with one or more of a staggering number of available codecs (compressor/decompressor). In order to watch it, you'll need the appropriate codecs installed on your PC. But which ones will you need?

You can download some codecs directly through Windows Media Player, but click "Yes" only if you entirely trust the company sending the codec.

Sometimes, the file extension will reveal the answer. WMV files, for instance, use Microsoft's Windows Media codec; naturally, these files are playable in *Windows Media Player* (although you might need to update *WMP* to the latest version).

Most of the time, however, you'll have no clue as to which codecs you'll need. One option is to download a codec pack—a comprehensive collection of the latest versions of every codec that whoever compiled the pack was able to dig up. Google "codec pack" and you might be tempted to download one of many codec packs. But we don't recommend it. Most codec packs have their own installers, and this should give you pause—*you have no idea what that executable could do to your PC.* That convenient codec pack might also be throwing in a keystroke logger, a virus, or enough spyware to transform your 3GHz P4 into the performance equivalent of a Mac Classic. Avoid the temptation.



If a video won't play properly, run it through G-Spot to discover what codecs you need. The "codec is installed" message in the upper right-hand corner tells us we're in like Flynn for this particular video.

Instead, mosey over to **www.headbands.com/gspot/** and download the *G-Spot Codec Information Appliance* (no snickering). Despite its wonky name, it's absolutely essential for serious video grazers. Install and launch the application, and wait just a few moments for it to scan your PC for installed codecs.

After that, all you need to do is drag the mystery video into the Path box in the upper-left corner. The required video codec will be reported in the Name box of the Video section. Just beneath that, the Audio section will report the necessary audio codec (if the clip includes sound). The gray Stat boxes in each window will even tell you whether or not you have the necessary codecs installed.

Software Disobedience

Remember that clunky gray box called *Windows Media Player* from a few years ago? Well, it's back and taking on a new life—a life of crime. It's been resurrected—in a manner of speaking—in the form of an application known as *Media Player Classic* (Google the term, as updates are moving targets). *Media Player Classic* became popular as a result of two programs floating around the net—*QuickTime Alternative* and *Real Alternative*. These executable files install the codecs necessary to play QuickTime and RealMedia files from within *Media Player Classic*.

The attraction is obvious: No more hand-to-hand combat trying to keep QuickTime out of your system tray, and RealPlayer... well, why? But we don't need legal counsel to figure out that both of these "alternative" codec installers likely infringe on Apple's and Real Audio's intellectual-property rights. And, once again, are you sure you know what's in that executable?

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The Celebrity Codec Roundup

There are a number of codecs we think everyone should have. Grab these, and chances are slim you'll ever face a blank screen instead of your downloaded... well, don't ask, don't tell!

DivX: Once a hacked version of Microsoft's proprietary MPEG-4 V3 codec, it was developed from scratch at version 4 and is now owned and distributed by DivxNetworks. It's the most popular codec based on the MPEG-4 spec, but losing ground to Xvid and Windows Media. Still, it's a must-have. Files encoded with DivX can have the extension of AVI or MPG. It's now at version 5.2.1, and a free version is available at **www.divx.com/divx/download/**.

Xvid: Xvid is an open-source alternative to DivX and is kind of like DivX' evil twin. Like DivX, it's based on the MPEG-4 spec, and files encoded with it will have either the AVI or MPG extension. Source code and information about the project are located at **www.xvid.org**, but you can get the compiled binaries by downloading the strange-sounding file Koepi's Binary at **www.divx-digest.com/software/xvid.html**.

Windows Media Video 9 series: Microsoft's home-brewed codec is a winner. File sizes tend to be somewhat smaller than DivX or Xvid results, and it's very fast. Windows Media 10 files have the WMV extension. If you have the latest version of Microsoft's *Windows Media Player* (version 10), you already have this one installed. If not, open *Internet Explorer* and run Windows Update.

RealMedia: Although not one of the most popular codecs, RealMedia files are common enough to make downloading the free version of RealPlayer worth the effort of finding it on Real's web site at **www.real.com**. RealMedia files have the .RM or .RAM extension.

QuickTime: Apple's proprietary codec has seen its popularity plummet in the last couple of years, but QuickTime is still employed as a streaming-media format, and for whatever reason, the majority of movie trailers still use it. Files using this codec have either the .MOV or .QT extension. You'll find the free version of the player at **www.quicktime.com**.

Bypass the annoying "connecting to codec server" screen by making sure you have all the necessary codecs installed on your PC. This will save you time and frustration.

AC3 filter: Many video files on the Internet are encoded with AC3 (Dolby Digital) sound, so grab the AC3 filter at **http://ac3filter.sourceforge.net/**.

VobSub: If your video clip has people making strange, exotic noises, it might be in a foreign language. That's why some of them come with subtitle files (usually in SRT format). Installing VobSub will allow media players that support these formats, such as *Media Player Classic* and *BSPlayer* **(www.bsplayer.org)**. ■

RESOURCES

Earn your BA in MPEG-4 with these helpful and chatty web sites

www.videohelp.com
Indisputably the most comprehensive web resource for information, tutorials, and software for converting video from any source into, well, whatever it's possible to convert it to. The catch? The site's design is hideous.

www.doom9.org
Although somewhat less voluminous than Videohelp.com, it's much easier on the eyes. You'll find extremely detailed guides here on ripping, converting, and encoding, as well as helpful tutorials dealing with subtitles and audio processing.

www.hydrogenaudio.com
The Betties and Bobbies over at Hydrogen Audio are the fussiest audiophiles on the planet, and the forums are practically hemorrhaging with the most-up-to-date chat on audio-compression codecs, encoding techniques, lossless encoder formats, and even MPEG-4 video-compression advice.

www.dvddemystified.com/dvdfaq.html
Curious about CSS encryption? Want to know the difference between closed captions and subtitles? Desperate for trivia to alienate potential soulmates at cocktail parties? The DVD FAQ is an all-you-can-eat buffet of information on DVD discs, formats, and players.

www.eff.org
Even if you haven't received a subpoena from the MPAA or the RIAA, every geek ought to troll the Electronic Frontier Foundation's web site at least monthly. Here's where you'll find the latest information on technology legislation while you can still do something about it: *before* it becomes law. Better yet, be a champ and donate your pocket change to the organization that successfully defended *Grokster*, Dmitry Sklyarov, and someday, maybe *you*.

www.microsoft.com/windows/windowsmedia/9series/encoder/default.aspx
Sliced bread is good. Windows Media Encoder 9 series is better. Hey, we're always game to humiliate the Beast of Redmond for its many foibles, but Microsoft's home-brew codec is fast, easy to use, and the results are stunning.

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Capture

Convert your old home movies to DVD

Copyrighted material

Edit, Burn

BY TAE K. KIM

How many of your precious memories are locked up in aging analog videotape? Your college graduation? Your wedding and honeymoon? Your baby's first steps? That time your buddy did a face-plant on the half-pipe. It's time you brought those old home movies into the digital domain, before the VCR goes the way of the floppy drive.

Inexpensive camcorders have been around since the early 1980s, but raw footage is rarely worth watching more than once. The key to producing enjoyable home movies lies in editing: 86 the dull moments, do some voiceover narration to add context, and lay down titles and credits. And since you'll burn the whole thing to DVD, create professional menus that will help viewers find exactly what they're looking for when they drop the disc in a player.

Pulling off this feat on your PC requires a combination of hardware and software—unless your PC came from the factory with a videocard already outfitted for analog video-capture duties. We tested four of the most common packages—from Pinnacle, ADS Tech, Adaptec, and Hauppauge—capable of digitizing analog video and transferring it to a computer's hard drive over a USB cable. (We chose this technology because it's more ubiquitous than FireWire, there's no difference in image quality, and there's no substantial difference in speed. For the record, FireWire *is* slightly faster.) We also evaluated the video-editing suites that come bundled with the video-capture boxes—and discovered we'd need to mix and match hardware and software to create the ultimate capture-edit-burn solution.

Once you've digested our hands-on reviews, move on to our step-by-step guide to digitizing, editing, and burning your own movies to DVD using Nero's *NeroVision Express 3*. When you're done, you'll have not only preserved your video memories, you'll have created movies that friends and family will enjoy for generations.

Pick the Perfect Hardware

Before you can save your video, you need a device capable of converting your analog video to a tasty digital stream. That's where these four hardware packages come in.

ADAPTEC VIDEOH! DVD

It might be short on frills, but Adaptec's VideOh! DVD is a solid video-capture device. It's also one of the three devices in our roundup to provide a built-in hardware MPEG-2 encoder (Hauppauge's WinTV-PVR and ADS Tech's DVDXpress being the others). The presence of the encoder led to satisfactory, but not outstanding, results in our vid-cap tests. We were less impressed with the bundled software: A limited version of Sonic's *MyDVD* is a decent DVD-authoring solution, but it can't match the functionality of a dedicated video-editing suite. We were also dismayed by the absence of a printed manual for the software.

It's hard to knock a hardware product for having weak bundled software, especially when the hardware performs so well; as it stands, however, we recommend the Adaptec VideOh! DVD only if you already own a standalone video-editing program (or don't intend to edit your footage). Anyone in the market for a complete, all-in-one solution should look elsewhere.

MAXIMUM PC VERDICT 8

+ OH MY!
Solid performance, and hardware MPEG-2 encoding delivers great performance and quality.

− OH NO!
Doesn't include a video-editing program.

$100, www.adaptec.com

ADS TECH DVDXPRESS

The ADS Tech DVDXpress is as simple and straightforward as its name suggests. It's a no-frills product—similar to the Adaptec VideOh! and the Pinnacle DVC-90—but it gets the job done. This small, unobtrusive unit includes inputs for analog audio and video (composite and S-Video); unlike the Pinnacle device, it outputs these signals only through its USB port.

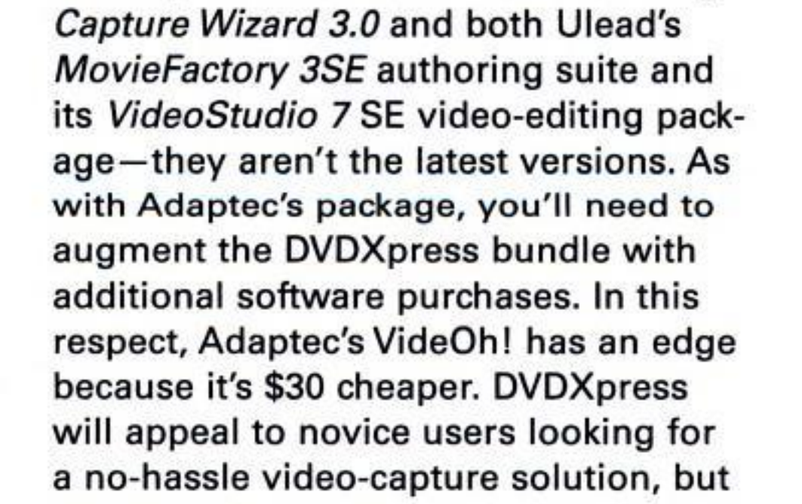
All in all, we were satisfied with the video we captured using the DVDXpress. But while the device comes with a plethora of software—including *Capture Wizard 3.0* and both Ulead's *MovieFactory 3SE* authoring suite and its *VideoStudio 7* SE video-editing package—they aren't the latest versions. As with Adaptec's package, you'll need to augment the DVDXpress bundle with additional software purchases. In this respect, Adaptec's VideOh! has an edge because it's $30 cheaper. DVDXpress will appeal to novice users looking for a no-hassle video-capture solution, but it's by no means the best product in this category.

MAXIMUM PC VERDICT 7

+ AD&D
Good performance and easy setup.

− ADD
Outdated software.

$130, www.adstech.com



HAUPPAUGE WINTV-PVR USB2

Hauppauge's WinTV-PVR USB2 is a feature-packed, Swiss Army knife of a product. And like that all-purpose gadget, it's pretty good for one application and mediocre for several others. Most importantly for our purposes, it's quite good at capturing video, thanks to hardware-based MPEG-2 encoding. As the "PVR" in its name suggests, it can also function as a TiVo-like personal video recorder, although its user interface isn't nearly as polished as TiVo's.

We were disappointed in Hauppauge's choice of software bundle—Ulead's *DVD MovieFactory 3*—because it's not a full-fledged video-editing suite. And the skimpy quick-start user manual did little to help us learn how to get the most of the product. These issues aside, we were impressed with the WinTV-PVR's performance in our video-capture tests, and its PVR capabilities will render it useful long after your vacation videos have been archived onto your hard drive.

Note: This is the same external tuner that came with the Dell Inspiron 9300 Media Center laptop reviewed on page 44. ▶

MAXIMUM PC VERDICT 8

+ HASSELBACH
Hardware MPEG-2 encoding, and PVR capabilities.

− HASSELHOFF
No dedicated video-editing suite, and inadequate documentation.

$150, www.hauppauge.com

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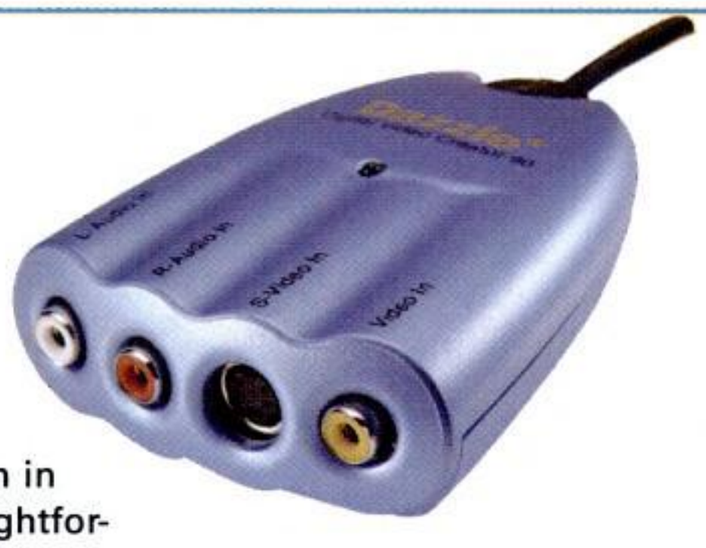
Capture, Edit, Burn

PINNACLE DAZZLE DVC90



Pinnacle's Dazzle DVC90 is aimed squarely at novice users. The DVC90—the least expensive solution in our roundup—is a straightforward, no-frills product that more than makes up for its plain-Jane trappings by performing its duties without a lot of hassle. The DVC90 doesn't even require an external power source: Because it doesn't have any power-hungry encoding hardware onboard, it draws juice directly from the host PC's USB port.

The DVC90 manages to deliver adequate performance despite this limitation. Pinnacle bundles the device with *Studio QuickStart,* a "lite" version of the company's hallmark *Pinnacle Studio* software. Although this version doesn't offer nearly as many features as *Pinnacle Studio Plus* or even the more basic *Pinnacle Studio,* it's enough to give any budding Kubrick a crack at making a home-video masterpiece.

MAXIMUM PC VERDICT 7

+ SUMMIT

Easy setup, decent performance, and a great price.

− BASE CAMP

No hardware encoder, and not as versatile as other options.

$90, www.pinnaclesys.com

PINNACLE STUDIO MOVIEBOX DELUXE

Pinnacle Systems bundles one of the best consumer-oriented video-editing packages around—*Pinnacle Studio Plus 9*—with the MovieBox Deluxe, but we were sorely disappointed with the video-capture device itself. Video captured through the MovieBox's composite video port exhibited severe jitter, as if our source device had a serious tracking problem. This had us baffled, because none of the other devices we tested had a problem digitizing from this same source. After experiencing the same problem using several different cables and VHS tapes, we concluded that the MovieBox is just highly sensitive to the slightest instability in composite input source. (Our conclusion was reinforced by the fact that we were able to capture composite video from a late-model DV camcorder without incident.)

With this in mind, it's difficult to recommend the MovieBox Deluxe for capturing analog video from the composite outputs of older video devices. Fortunately, *Pinnacle Studio Plus* is available as a stand-alone package for just $100.

MAXIMUM PC VERDICT 5

+ BOX LUNCH

Good software bundle, and it's pretty, too!

− BOXCAR

Video-capture sensitivity is worrisome.

$250, www.pinnaclesys.com

VIDEO-CAPTURE DEVICE FEATURES

PRODUCT	VIDEO INPUT	VIDEO OUTPUT	AUDIO INPUT	AUDIO OUTPUT	PC INTERFACE	HARDWARE MPEG-2 ENCODER?	VIDEO-EDITING SOFTWARE INCLUDED?	PRICE
ADAPTEC VIDEOH! DVD	Composite, S-Video (NTSC or PAL)	None	Stereo (2 RCA)	None	USB 2.0	Yes	No	$100
DVDXPRESS	Composite, S-Video (NTSC or PAL)	None	Stereo (2 RCA)	None	USB 2.0	Yes	Yes (*Ulead VideoStudio 7 SE*)	$130
HAUPPAUGE WINTV-PVR USB2	Composite, S-Video (NTSC only), TV Antenna	None	Stereo (2 RCA), FM Antenna	None	USB 2.0	Yes	No	$150
PINNACLE DAZZLE DVC90	Composite, S-Video (NTSC only)	None	Stereo (2 RCA)	None	USB 2.0	No	Yes (*Pinnacle Studio QuickStart*)	$90
PINNACLE STUDIO MOVIEBOX DELUXE	Composite, S-Video (NTSC only)	Composite, S-Video (NTSC only)	Stereo (2 RCA)	Stereo (2 RCA)	USB 2.0, FireWire	No	Yes (*Pinnacle Studio Plus 9*)	$250

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Pick the Perfect Software

Nonlinear video editing ain't easy. With this in mind, we tested the top three video-editing software packages to see which one best balances a rich feature list and ease-of-use.

ADOBE PREMIERE ELEMENTS

Adobe's *Premiere Elements* is an intriguing product: It offers a taste of the company's high-end video-editing software at a price that's accessible to the average consumer. *Premiere Elements* retains some of the power of its professional sibling (including support for up to 99 video tracks and 99 audio tracks), but it's also just about as complex. First-time users will be overwhelmed by the program's editing interface, which is much less intuitive than those found in the other packages here.

Premiere Elements offers you much more control, but you have to suffer through a steep learning curve before you feel comfortable with it. We should also note that the program can capture video *only* from a DV camera.

If you're willing to invest a significant amount of time in order to take advantage of *Premiere Elements'* power, give the program a look. If you want instant gratification, we recommend a less complicated program.

***Premiere Elements'* interface has a steep learning curve, but it's the most powerful in our roundup.**

MAXIMUM PC VERDICT 7

$100, www.adobe.com

***VideoStudio 8's* Movie Wizard divides the video-editing process into seven steps.**

ULEAD VIDEOSTUDIO 8

If Adobe's *Premiere Elements* is perched at the top of the learning curve, Ulead's *VideoStudio 8* resides near the bottom. We found the program to be incredibly user-friendly—it even offers a wizard that holds your hand through the video-capturing, video-editing, and DVD-authoring processes. The wizard isn't perfect—the automatic editing feature is limited, and you should never trust the software to do what you should do for yourself—but parts of it are very helpful. The interface is clean and easy to navigate, and editing chores are a snap to accomplish.

VideoStudio 8 isn't without its faults, however: selecting options using the in-program menus requires an annoying number of mouse clicks, and the product sticks closely to its newbie-friendly roots. If you're looking for more options, go for *Premiere Elements*. If you're not ready to deal with that program's complexity, consider *Pinnacle Studio Plus 9*. (VideoStudio 9 hit shelves at press time and we squeezed the demo on the CD. So try it out!)

MAXIMUM PC VERDICT 8

$100, www.ulead.com

PINNACLE STUDIO PLUS 9

Pinnacle develops video-editing systems for the broadcast television market, and the company's always done an excellent job of bringing this technology into its consumer-oriented products. Today, there's a Pinnacle video-editing solution for just about every budget. *Pinnacle Studio Plus 9* is the company's midrange offering, and it's packed with features that amateur directors will appreciate.

We found the program's user interface to be a breeze to navigate, making it very easy for us to perform basic video-editing tasks. We captured our source video, made a few minor edits, added some visual effects, and burned the entire production to DVD with minimal effort.

We were also impressed with the depth of *Pinnacle Studio Plus 9's* video and audio options—including picture-in-picture, chroma key (blue screen), and support for Dolby Digital surround sound. There was one aspect of the program that we found to be truly annoying, however: many features must be purchased and unlocked online before you can use them. This left us with a serious case of the "look-but-don't-touch" blues.

***Pinnacle Studio Plus 9's* simple interface belies the fact that it's packed with useful features.**

MAXIMUM PC VERDICT 8

$100, www.pinnaclesys.com

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Capturing Video

So you've purchased a hardware video converter, installed the necessary software, and dusted off your old home videos. Your next task is to capture that analog video onto your computer's hard drive, converting it to digital video in the process. We'll show you how, using a standard VCR as the source, Adaptec's VideOh! DVD as the capture device, and *Pinnacle Studio Plus 9* as the capture software. You could just as easily use any other combination of hardware and software (substituting a camcorder for a VCR, for example, if you're capturing from 8mm, Hi8, or VHS-C tape)—the steps will be the same.

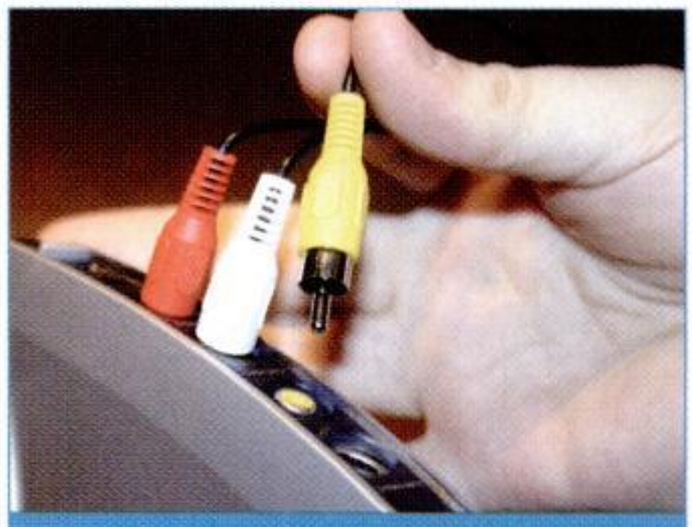
1) SET UP YOUR VIDEO-CAPTURE HARDWARE

First, set up your video-capture hardware by plugging in the power and USB cables, and then connecting the device to your PC. Load the appropriate drivers from the included installation CD when prompted.

Each of the video-capture units in this roundup uses a USB 2.0 connection, and for good reason: USB 1.0's woefully slow bandwidth isn't suitable for capturing DVD-quality video.

2) CONNECT YOUR SOURCE

Next, plug your source device's video and audio outputs into the video-capture hardware. In this example, we're using a VHS VCR's composite-video output and stereo-audio outputs.



Audio and video cables and inputs are color-coded for easy identification.

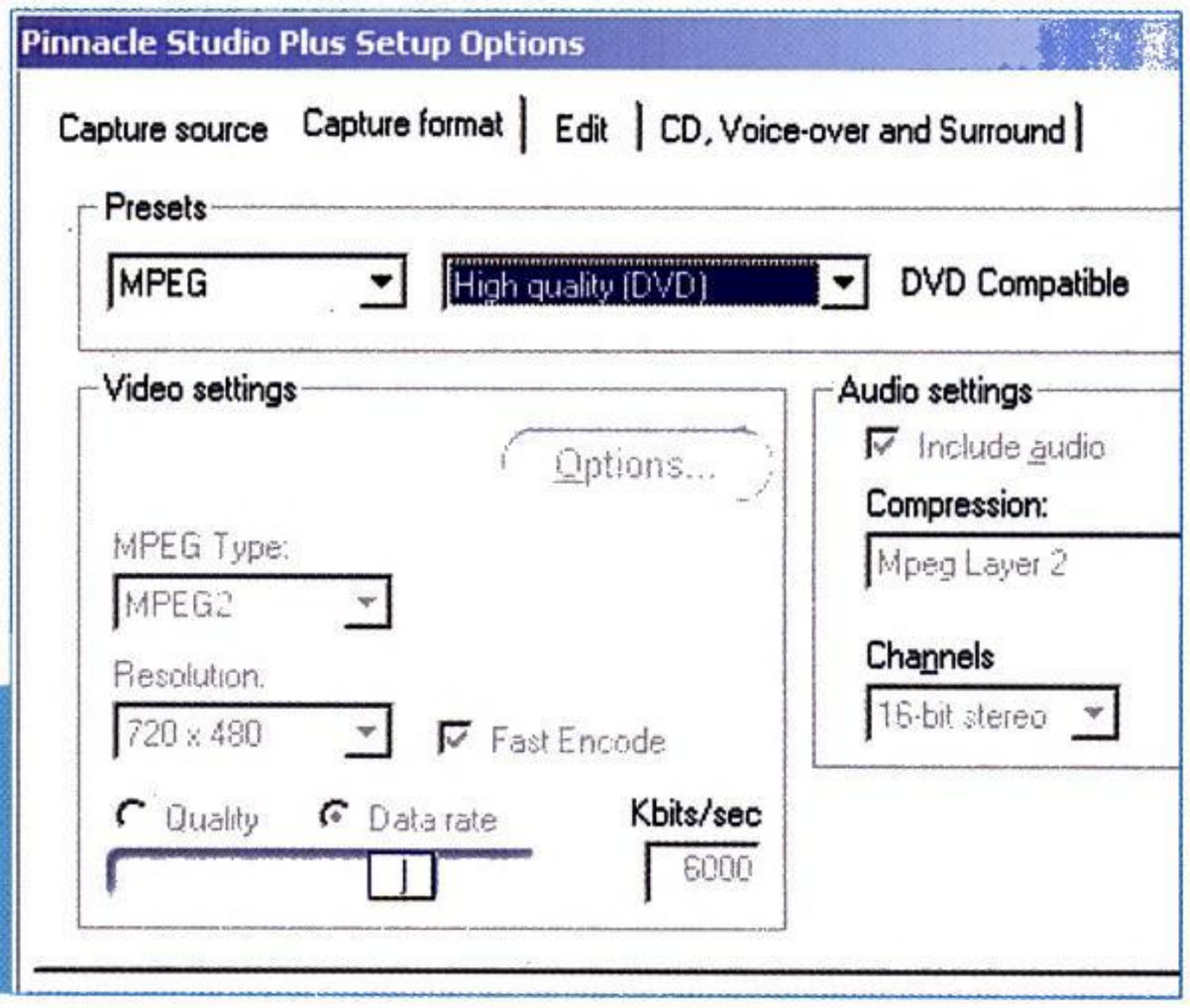
3) CAPTURE YOUR VIDEO

Launch your video-capture software. (We're using *Pinnacle Studio Plus 9* in this example, but the process will be similar with most programs.) Click the Capture tab to begin the process.

Video capture is the first step in the video-editing process, so consumer-oriented programs such as *Pinnacle Studio Plus 9* make that feature easy to find.

4) CONFIGURE YOUR CAPTURE SOFTWARE

We'll use this menu to set our capture options. Because we'll eventually burn our movie to DVD, we might as well encode the video to MPEG-2 format while we're capturing it to the hard drive. Click the Settings button and then click the "Capture format" tab. Change the preset to MPEG video and set the quality setting to High; this will output video in 720x480 resolution.



Although it eats up a lot of space on your hard drive, MPEG-2 video at 720x480 resolution delivers the best results for DVD video.

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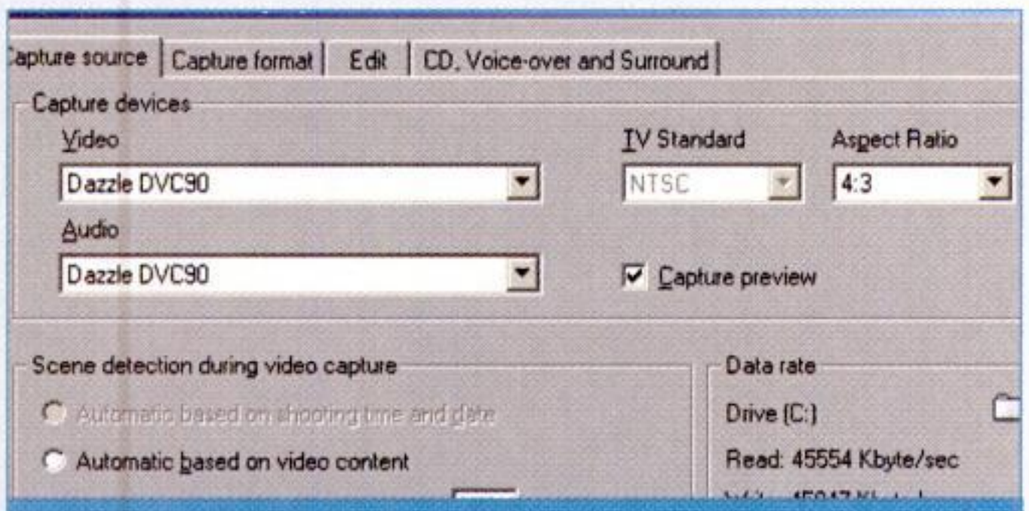
5) MAKE A SCENE

Next, click the "Capture source" tab. Make sure your video-capture hardware is listed as both the Video and Audio source. You'll see several options in the box labeled "Scene detection during video capture." These settings will break your captured video into easier-to-manage chunks. We decided against using either of the automatic settings because we found them to be unreliable; instead, we set up the software to create a scene every five minutes. You might prefer to designate scenes manually by tapping the space-bar. Once you've made your choices, click the OK button to return to the Capture menu.



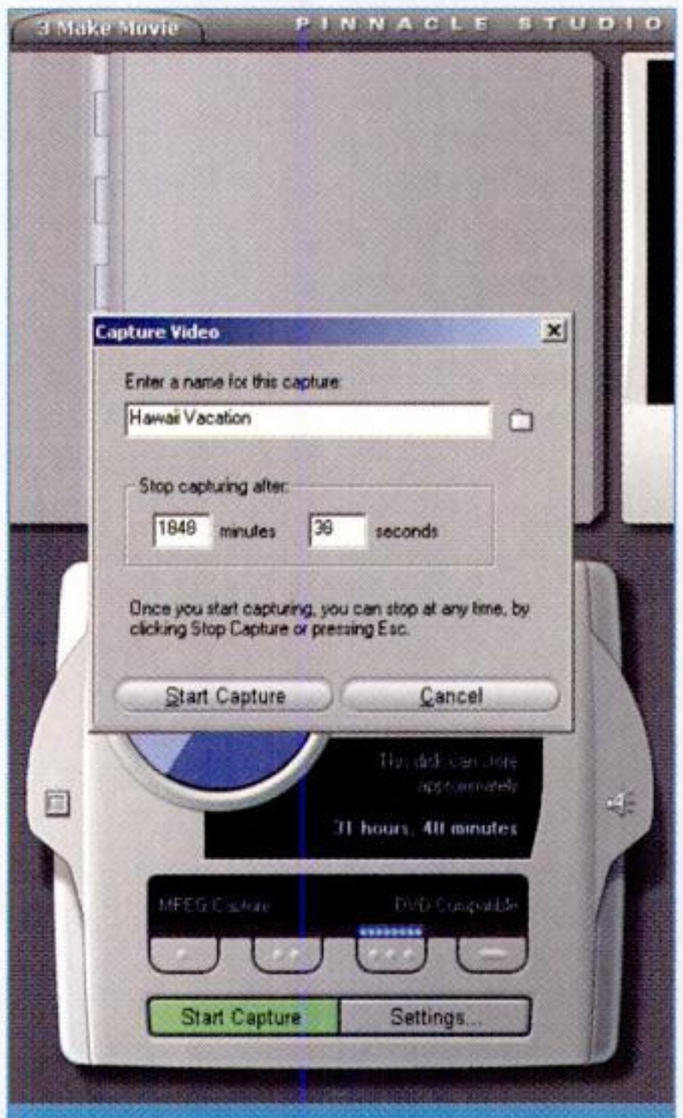
Breaking your captured footage into intervals will make editing chores a breeze.

6) CHOOSE A DESTINATION

Now you need to tell the software where it should store your captured video. If your system has more than one drive—a good idea if you intend to do a lot of video editing—choose the fastest drive for this task. You can accept or override the default file name. Once you've decided on a location, click OK and return to the main capture menu.

7) CAPTURE YOUR VIDEO

Click the Start Capture button and a dialog box pops up asking for a file name. We've called our example project "Hawaii Vacation." When you're ready, hit the Start Capture button. To guard against missing any footage, allow five seconds to elapse before you hit the Play button on your source device.



Give your captured footage a recognizable and descriptive name so it's easy to identify later.

8) THAT'S ALL, FOLKS!

Capture about five seconds beyond the material you're interested in, and leave the capture program running for a few seconds after you've pressed Stop on your source device; again, the point is to ensure that you're captured everything you want. Blank spots and extraneous material can be easily trimmed away using your editing software. And that's it! Your footage has been captured and converted into high-quality MPEG-2 video. Now you can either load the footage into your video-editing program or burn the file to DVD as-is.

General Editing Tips

■ Remember, the video you capture will be only as good as the source from which it came. If you've been storing your old tapes at the bottom of a dusty closet, or if the tape itself is old and worn, you can expect the captured video to reflect that abuse.

■ "Pack" your videotape by fast-forwarding it all the way through, and then rewinding it before you begin your capture session. This will ensure that the tape moves through the source device's transport mechanism—and over the read heads—smoothly and consistently.

■ If your source device offers S-Video outputs (as do all S-VHS and Hi8 devices), use that instead of the composite output. An S-Video signal carries the video's chrominance (hue and saturation) and luminance (brightness) information separately and will deliver a much higher-quality picture than a composite-video signal.

■ It's easy to get carried away with elaborate titles and gimmicky scene transitions (sweeps, crawls, peels, and the like). Use these effects sparingly—quick fades usually work best—or your audience will perceive your videos as amateurish and lame.

■ Make sure you have enough space on your hard drive. One hour of video captured in MPEG-2 at 720x480 resolution will consume 3GB of space. If you can swing it, purchase a spacious 7,200rpm drive and dedicate it to video captures.

■ A professional moviemaker might shoot 1,000 hours of material in an effort to produce 90 minutes of compelling storytelling. Ruthlessly edit your raw footage until every second of it is interesting. No one wants to watch two hours of Junior's soccer game, but they'd probably enjoy watching a few good slide tackles and the winning goal.

■ Use your capture software's scene-detection option. If you discover that the automatic settings don't work very well, use the manual feature. Whichever method you choose, it's much easier to edit a series of smaller clips than to slice and dice long stretches of video.

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Capture, Edit, Burn

Burning to DVD

All the video-editing and DVD-authoring suites we've discussed are capable of burning your video to a DVD that can be played on a set-top DVD player. Having said that, however, we recommend turning the DVD-authoring chores over to Ahead's *NeroVision Express 3* software (you can download a free trial version from www.nero.com). Burning a DVD can consume an incredible amount of time, and let's face it: blank DVDs aren't cheap. This rock-solid program has never let us down when it comes to burning DVD movie discs, and we find the user interface to be very intuitive.

Let's take a step-by-step look at how to burn your captured video onto a DVD, complete with menus, using *NeroVision Express 3*. At this point, we're assuming you've already captured your video, using the process we described; made your edits; and saved the footage as a DVD-quality MPEG-2 file.

1) LAUNCH NEROVISION EXPRESS 3

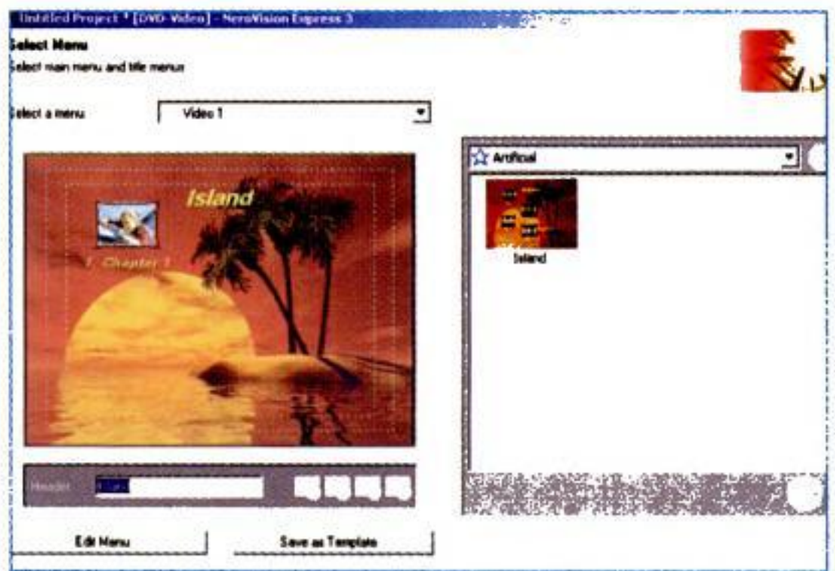
The interface menu on the right side of the screen lists the available options. We're interested in the Make DVD option. Place your cursor over the icon and you'll be offered two sub-options: "DVD-Video" and "DVD-Video (VR)." The latter choice is of interest only if you happen to own a stand-alone, set-top DVD recorder, so click DVD-Video.

2) CHOOSE YOUR CONTENT

The next step is to choose the content you wish to burn to your DVD. Click the option to Add Video Files from the menu on the right side of the screen, and then use the file dialog box to open the MPEG-2 video files you captured and edited earlier. Once you've finished choosing video files, click Next to begin creating your DVD menus.

3) CREATE A DISC MENU

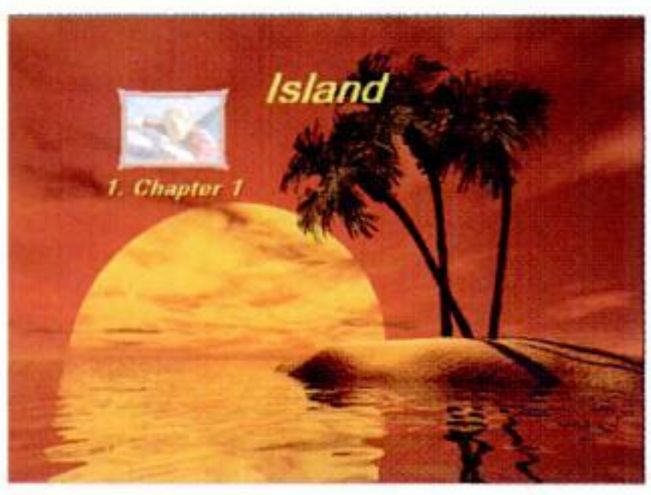
Although it might seem simplistic, *NeroVision Express 3* offers plenty of options for creating attractive menus, which you'll eventually use to navigate your DVD. Click the Edit Menu button to make changes to any of the stock menus, including adding animations and text. You can also download additional menu templates from Ahead's website, or even design your own. Muck around with the menu titles until you're happy with them, and then click Next to preview your new menu before burning the project to disc.



It isn't an absolute necessity, but if you take the time to design an interesting menu, your home movies will exhibit a polished, professional touch that your audience is sure to appreciate.

4) TEST YOUR MENU

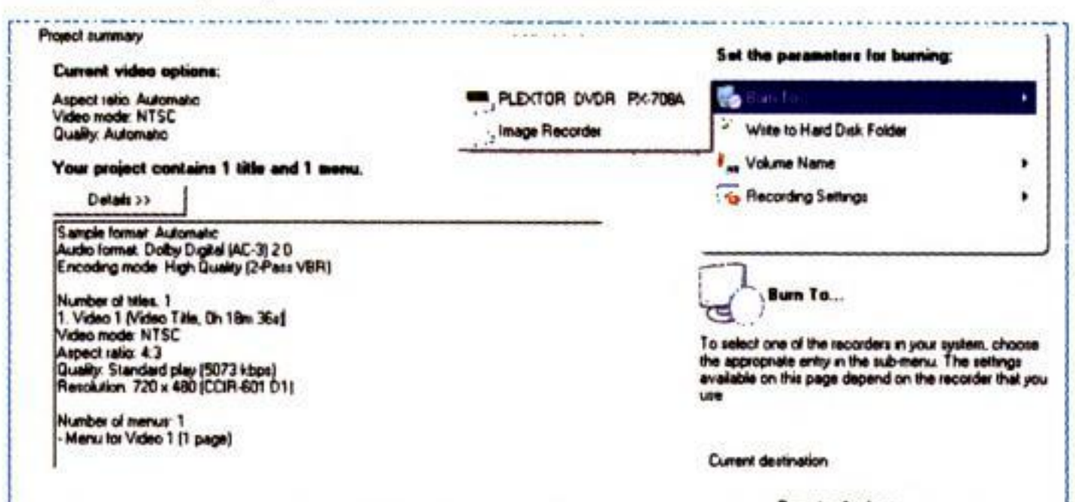
Use the virtual remote control and the Preview Menu Animations button to test your menu. Spend some quality time exploring each menu to make sure it's logical and works exactly the way you envisioned it. Click the Next button when you're satisfied.



Use the Preview screen to test-drive your DVD before committing it to disc. Make sure the menu functions as it should and that it's easy to navigate.

5) BURN YOUR MOVIE TO DVD

You're in the home stretch. The final step is to actually burn your home movie to DVD. Click Volume Name in the right-hand menu and christen your masterpiece with a suitable moniker. Next, click Burn To... and indicate your DVD burner as the destination device. Finally, click the Burn button in the lower-right corner and pat yourself on the back. You're done! ■



Make sure you have a blank DVD loaded in your DVD burner before attempting to burn a disc, or your computer will secretly make fun of you.

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MARK NOACK AND
LOGAN DECKER

MAXIMUM PC'S VISUAL GUIDE TO FLASH MEMORY

ALL CARDS SHOWN AT ACTUAL SIZE

During the last two years, the removable-memory landscape has changed dramatically. Since then, some formats have risen and others have sunk. Here's a quick field guide to all the formats you need to know about today.

CompactFlash

USED IN: Digital cameras, PDAs

CURRENT MAXIMUM CAPACITY: 12GB ($9,500)

COST PER MEGABYTE (AT MAXIMUM CAPACITY): $0.80

DURABILITY: The sturdiest flash memory around.

THE GOOD: Can be used in the PC card slot of laptops with an inexpensive adapter; "professional" versions support transfer rates up to 12MB per second.

THE BAD: Extremely bulky by today's "World of Tomorrow" standards; faster CompactFlash cards are significantly more expensive (usually around 30 percent) than the standard variety.

THE INTERESTING: Type I refers to cards that are .14-inches thick. Type II refers to cards that are .20-inches thick.

PROGNOSIS: The huge number of CompactFlash-dependent devices still in use today virtually guarantees that this format will remain common.

MicroDrive

USED IN: Digital cameras, PDAs, and most devices with a Type II CompactFlash slot

CURRENT MAXIMUM CAPACITY: 6GB ($270)

COST PER MEGABYTE (AT MAXIMUM CAPACITY): $.05

DURABILITY: Don't drop it!

THE GOOD: A technological marvel; hard drive compatible with most CompactFlash Type II devices.

THE BAD: Literally a tiny hard drive, the MicroDrive consumes much more power than flash memory, and is still scary-slow compared to the pokiest flash media.

PROGNOSIS: Iffy—the MicroDrive may be eclipsed by smaller and less expensive miniature hard drives (such as Toshiba's .85-inch hard drive and the Cornice Storage Element) that aren't intended to be removed.

SmartMedia

USED IN: Vintage MP3 players and digital cameras

CURRENT MAXIMUM CAPACITY: 128MB ($20)

COST PER MEGABYTE: $0.16

DURABILITY: Very thin and prone to breakage.

THE GOOD: Way back when, the slender SmartMedia cards allowed manufacturers to create smaller MP3 players and digital cameras.

THE BAD: Must be handled with care; low capacity.

PROGNOSIS: Moribund—consumer electronics moved on from this low-capacity, fragile format years ago.

Prices, capacities, and cost per megabyte reflect those in effect at press time—hey, we're not psychics!

miniSD

USED IN: Cameras, PDAs, cellphones

CURRENT MAXIMUM CAPACITY: 256MB ($60)

COST PER MEGABYTE (AT MAXIMUM CAPACITY): $0.23

DURABILITY: Rigid plastic is tough, but dangerously tiny size makes us nervous.

THE GOOD: miniSD brings oodles of storage to ultra-compact digital cameras and cellphones; can be used in SD slots with adapter.

THE BAD: Low adoption rate in consumer electronics.

THE INTERESTING: miniSD can be used in standard SD card slots with the appropriate adapter.

PROGNOSIS: Borderline—backwards compatibility with SD is a nice touch, but ultra-mini digital cameras and camera phones might opt for the even smaller microSD format.

MMC

USED IN: MP3 players, digital cameras, cellphones

CURRENT MAXIMUM CAPACITY: 1GB ($75)

COST PER MEGABYTE (AT MAXIMUM CAPACITY): $0.08

DURABILITY: They look fragile, but even we klutzes have yet to break one.

THE GOOD: Very small size; works in today's ubiquitous SD card slots.

THE BAD: SD cards have edged out this format.

PROGNOSIS: Because this format lacks the encryption facility built into SD cards, the only thing keeping it alive is its compatibility with SD slots.

MemoryStick/MemoryStick Pro

USED IN: Sony products (digital cameras, vidcams, laptops, et al.)

CURRENT MAXIMUM CAPACITY: 512MB ($100), 4GB High-Speed Pro ($700)

COST PER MEGABYTE (AT MAXIMUM CAPACITY): $0.20/$0.08 High-Speed Pro

DURABILITY: Very durable—rivals SD.

THE GOOD: Usable in the vast complement of Sony consumer electronics; features write-protection.

THE BAD: Very few products outside the Sony stable use this format.

PROGNOSIS: Sony's a tenacious company, so like it or not, MemoryStick is here to stay.

SD

USED IN: MP3 players, digital cameras, PDAs, cellphones

CURRENT MAXIMUM CAPACITY: 2GB ($200)

COST PER MEGABYTE (AT MAXIMUM CAPACITY): $0.10

DURABILITY: Just like MMC cards, these babies are pretty tough.

THE GOOD: Improves on MMC with built-in encryption for read-only software distribution, faster transfer rate, and lower power consumption.

THE BAD: Still physically too large for today's cellphones.

PROGNOSIS: SD's balance of size, capacity, and features makes it an ideal format for all types of personal electronics. Manufacturers agree, so expect to see SD slots around for a very long time.

xD

USED IN: Digital cameras—mainly Olympus and Fujifilm

CURRENT MAXIMUM CAPACITY: 1GB ($100)

COST PER MEGABYTE: $0.10

DURABILITY: Comparable to SD, but slightly smaller. Designed to be handled.

THE GOOD: Relatively swift transfer rates in an itty-bitty formfactor; can store "panoramic" photos on selected Olympus camera models.

THE BAD: Limited adoption among digital-camera manufacturers.

PROGNOSIS: Fuji and Olympus wanted xD to become the "it" standard for digital cameras. Alas, other cam manufacturers shunned xD in favor of more open formats such as SD and miniSD, so its longevity is far from assured.

MemoryStick Duo/MemoryStick Pro Duo

USED IN: Sony products, including cell phones and the foxy new PSP!

CURRENT MAXIMUM CAPACITY: 512MB ($105)/2GB High-Speed Pro Duo ($450)

COST PER MEGABYTE (AT MAXIMUM CAPACITY): $0.20/$0.23 High-Speed Pro Duo

DURABILITY: Just as durable as the full-size MemoryStick.

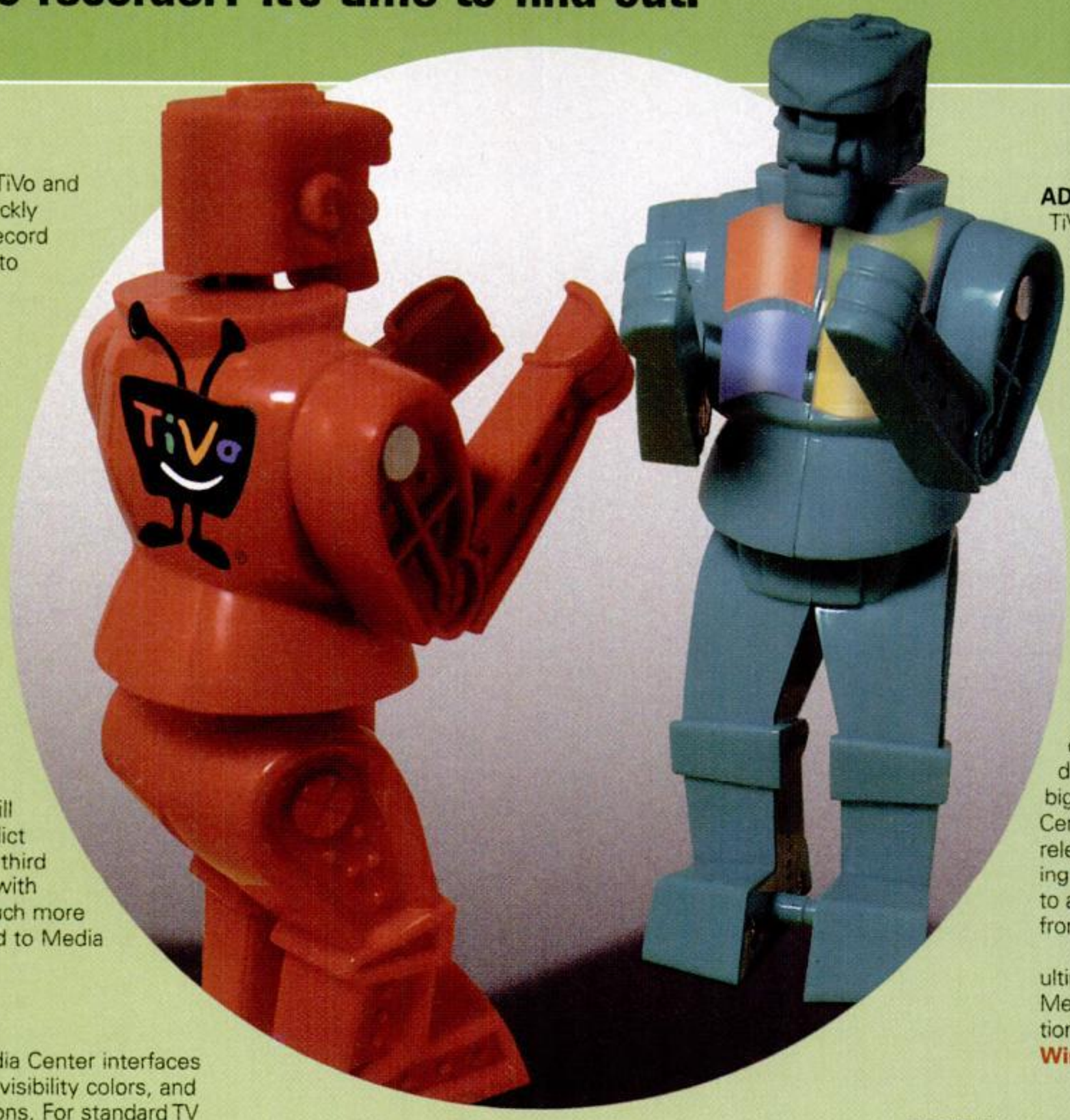
THE GOOD: Can be used in MemoryStick slots with an adapter.

THE BAD: No significant advantages over more standard formats such as SD.

PROGNOSIS: Sony won't let go of this one, so expect it to be around a long time.

WinXP Media Center vs. TiVo

Can the new incarnation of Microsoft's living room OS beat the original personal video recorder? It's time to find out!



PVR FUNCTIONALITY: Both TiVo and Media Center allow you to quickly and easily pause live TV and record future shows. Both allow you to extend the stop times of your recordings—very important for live events like sports. Unfortunately, both also suffer from the same annoyance: If you pause a TV show and walk away right before a scheduled recording, you'll miss the prompt that asks you if you want to stay on your current channel or start recording the new program. This could cause you to miss the rest of the show you paused.

While it's a rare situation these days, if you have multiple cable boxes in your living room, Media Center 2005's built-in multiple tuners eliminates this problem: the box will automatically resolve the conflict by switching to the second or third tuner. This feature, combined with the fact that a PC provides much more storage capacity, gives the nod to Media Center.

Winner: Media Center

ADVANCED FEATURES: Both TiVo and Media Center have a nice set of advanced features. Both can be integrated into your home network (although TiVo charges you for the privilege). Interestingly, one of Media Center's standard features—the ability to listen to your music library and view photos—is an optional feature for TiVo. But there are a couple of kickers: You can set TiVo to record over the Internet, and Tivo goes out and records TV shows it thinks you'll like without any prompting from you. Media Center counters this round to a draw, however, with two big 'uns: First, optional Media Center extenders (due to be released in November, including one for Xbox) will allow you to access your Media Center from any TV in the house.

Second---and this is the ultimate advanced feature—a Media Center is a fully functioning WinXP PC.

Winner: Draw

INTERFACE: The TiVo and Media Center interfaces both present legible text, high-visibility colors, and easy-to-understand menu options. For standard TV viewing, TiVo allows you to see more upcoming programs onscreen at a time for any given channel, which makes for easier recording. But people who watch a lot of movies on TV will fall in love with Microsoft's innovative and incomparable movie-viewing interface, which allows you to browse through currently playing and upcoming movies as if you were selecting them from a pay-per-view menu. Because it ultimately depends on your viewing preferences, this one's a toss-up. **Winner: Draw**

RELIABILITY: This category is a big one. Media Center crashes occasionally coming in and out of sleep/hibernation and screensaver modes. Microsoft told us this issue is due primarily to driver-level faults, and that, more often than not, videocard drivers are to blame. This is a massive setback for Media Centers: if your PC crashes upon waking up, it won't be able to record your favorite shows and movies. In stark contrast, over the four years we've used TiVo, we've witnessed only three crashes. **Winner: TiVo**

COST: TiVo costs $130 and includes a $12.95-per-month fee or a $300 lifetime fee (which provides he service for as long as you use your TiVo). Media Center PCs cost $1,500 to $2,500. But before you jump to any conclusions, consider this: When combined with a high-quality set of PC speakers, a Media Center PC can (and should) replace your DVD player and your expensive receiver/amplifier. TiVo can't. Even so, TiVo's cost is hard to beat. **Winner: TiVo**

THE UPSHOT

When we first dove into this Head2Head a few months ago, we thought TiVo would simply blow WinXP Media Center Edition out of the water. Microsoft's release of the 2005 version of the OS, however, leveled the playing field a bit by providing a more powerful and deep interface that's even easier to use than before, plus the ability to easily scan and record movies.

The categories indicate that TiVo wins by a final tally of two-to-one, but in our minds this contest isn't even that close because of one reason: reliability. Simply put, TiVo rarely, if ever, fails us. Crashes are virtually nonexistent on its Linux-based platform. Media Centers are another story. PCs crash, and crash regularly, and missing a scheduled recording because of a crash or lock-up is inexcusable.

With this said, if Media Center can overcome this critical shortcoming—and it's no small task given the wide range of hardware and driver combinations—we see a potentially bright future for the platform.

TiVo wins—for now.

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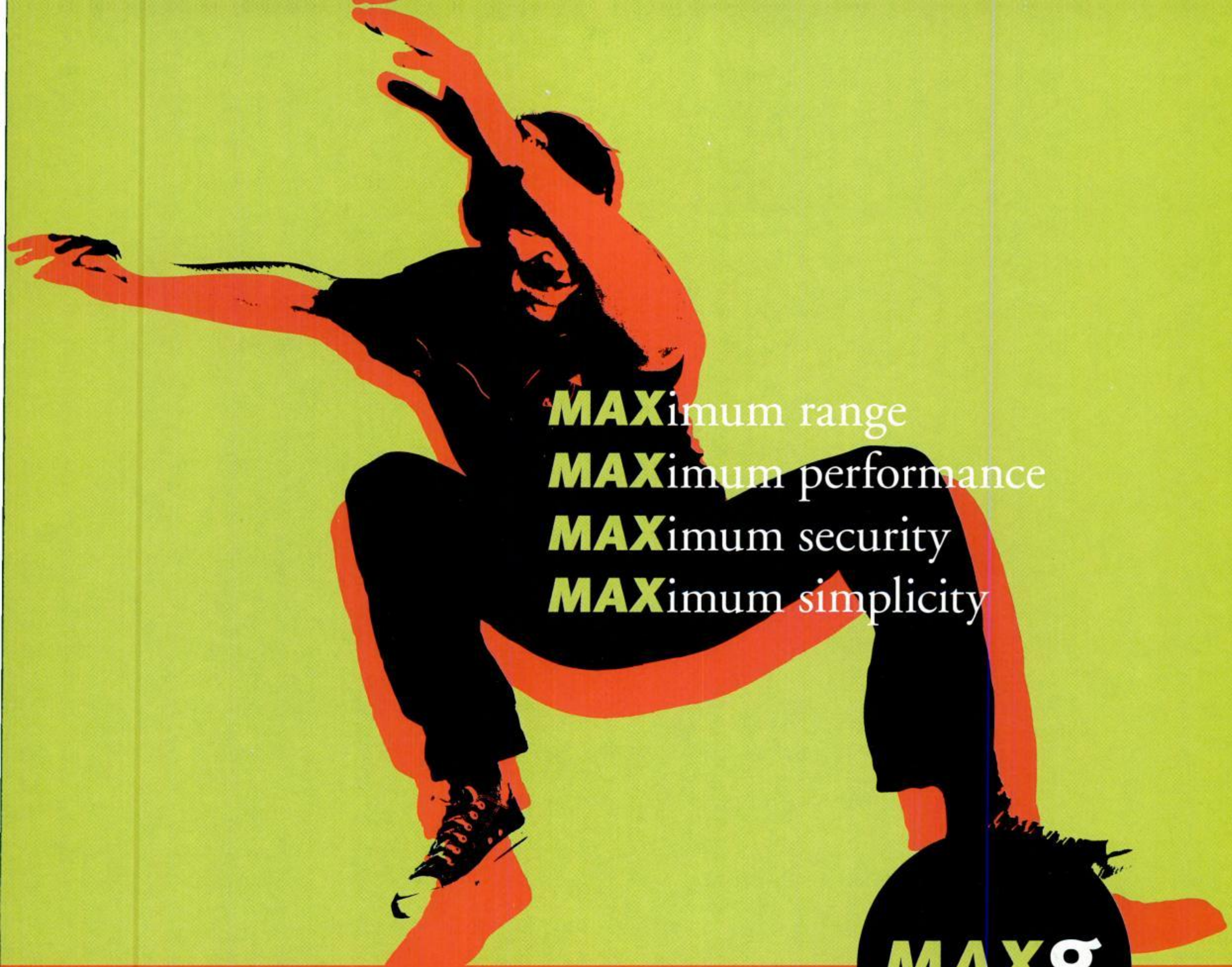

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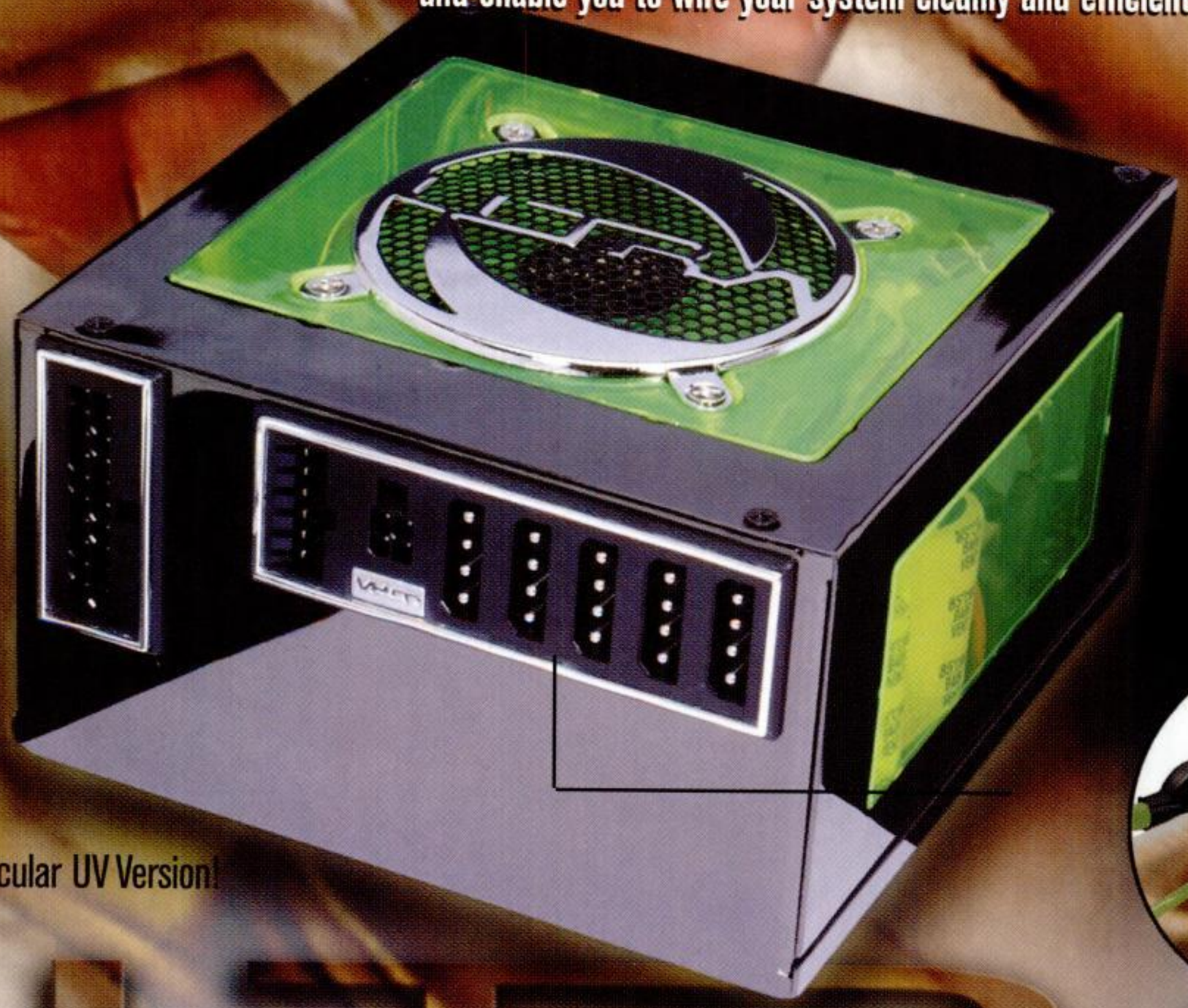

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